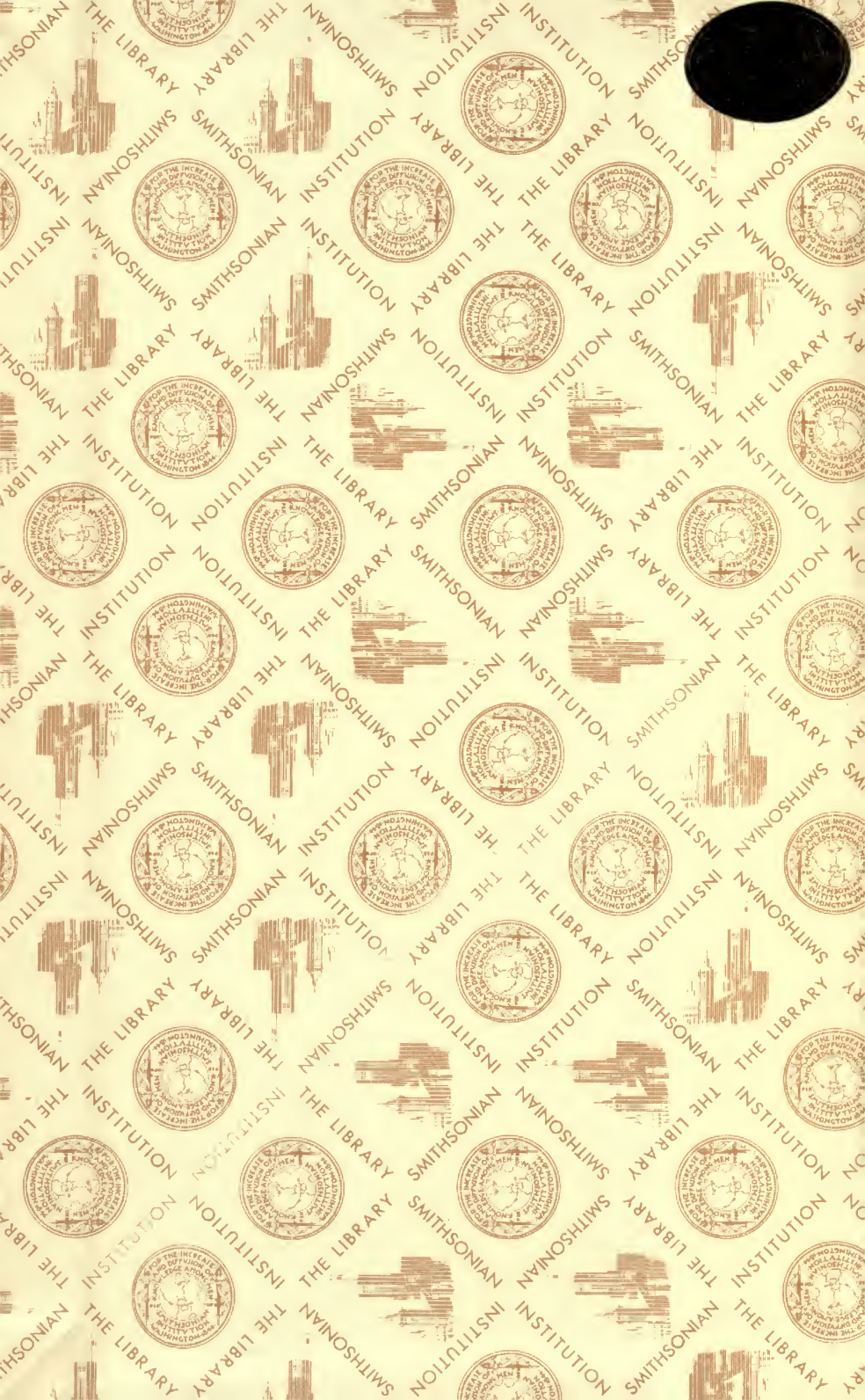
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THE LIBRARY

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TWENTY-FOURTH EDITION.

Established in 1783.

A PRICED AND ILLUSTRATED CATALOGUE OF

Meteorological and Philosophical

INSTRUMENTS,

AND

SCHOOL AND CHEMICAL APPARATUS,

MANUFACTURED AND SOLD BY

W. MITCHELL McALLISTER,

728 Chestnut Street, Philadelphia.

1869

PRICE, TEN CENTS.

NOTICE!

TERMS CASH.

Persons ordering will please give the date of the Price List, as the numbers attached to the articles do not, in all cases, correspond to those in former editions.

Every Instrument is guaranteed to be made and finished in the most superior manner, and each Instrument is guaranteed to perform the experiment for which it is made.

The best mode of remitting money is by a draft on any banker or broker in Philadelphia or New York, made payable to my order. If this cannot be obtained, the money can be forwarded with equal safety by Express, or by a Post Office money order. If notes are sent by mail, the letter should be registered. Remittances in all cases at the expense and risk of the person sending.

When bills are ordered to be collected by Express, a remittance of ten dollars must accompany the order. Bills of less amount will not be collected by Express. The Express charge for collection will be added to the amount of the bill.

IT IS BY FAR THE CHEAPEST, BEST AND QUICKEST WAY, TO SEND THE MONEY WITH THE ORDER. IT SAVES DELAY AND EXPRESS CHARGES.

A charge will be made for boxes: and on Philosophical Apparatus, a charge of 25 per cent. on the amount of the order, will be made for boxes and packing.

Goods ordered to be sent by mail must be prepaid: therefore the postage must be included in the remittance.

All goods are packed with care, and warranted to be in good order when they leave the store; but I do not hold myself responsible for any damage goods may receive in transportation.

Correspondents will oblige by giving the Post Office address to which their answers are to be directed, and also the Express Station to which the goods are to be forwarded; name the County as well as the State, for in some States there are several Post Offices and Stations of the same name.

Apparatus imported on commission for chartered Institutions, from any of the foreign manufacturers at their catalogue prices.

I am also prepared to furnish any piece of apparatus, illustrated or described in the catalogues of other makers or dealers, though it may not be specified in this catalogue.

W. MITCHELL McALLISTER,

728 Chestnut Street, Philada.

October, 1868.

N. B.—A liberal discount allowed to dealers.

C681.2085
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1869

A PRICED AND ILLUSTRATED

CATALOGUE

OF

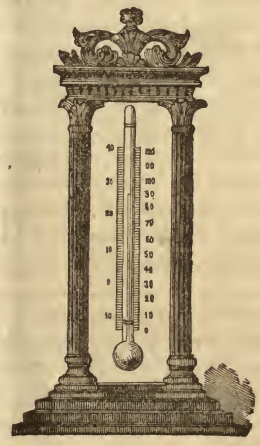
Meteorological and Philosophical Instruments,

AND

CHEMICAL AND SCHOOL APPARATUS.

Thermometers.

750.



783.

52543

750.	Thermometers, japanned tin cases	$ 50
751.	" " " 7 inches long	75
752.	" " " 8 "	1 00
753.	" " " 10 "	1 25
754.	" " " 12 "	1 50
755.	" " " 14 "	2 00
756.	Thermometers, same as No. 753, but with heavy scale, and graduated to 212°	1 50
757.	Thermometers, same as No. 754, but with heavy scale, and graduated to 212°	2 00
758.	Thermometers, same as No. 755, but with heavy scale, and graduated to 212°	3 00
759.	Thermometers, copper cases, 8 inches long, for sea steamers	2 00
760.	" " " 10 " " "	2 50
761.	" " " 12 " " "	3 00
762.	" " " 14 " " "	4 00
763.	" morocco cases, for travellers, ivory scale 3½ inches long	1 50
764.	Thermometers, morocco cases, for travellers, brass scale	2 00
765.	" boxwood, tube set in the wood, 6 inches long	1 50
766.	" " " " " 8 "	2 00
767.	" " " " " 10 "	2 50
768.	" " " " " 12 "	3 00
769.	" " " " " 14 "	3 50
770.	" " chemical, with hinge, allowing the bulb to be immersed in water, acids, and graduated to 300 and 700° each	2 50 to 4 00
771.	Thermometers, enclosed in glass tubes, with paper scales, from 4 to 15 inches long, graduated to 100 and 220°	1 00 to 2 50
772.	Thermometers, enclosed in glass tubes, with porcelain scale, 4 to 15 inches long	1 50 to 4 00
773.	Thermometers, same as No. 772, but graduated to 500 and 700°, 12 and 15 inches long	3 50 and 4 50
774.	Thermometers, boxwood, self-registering, with spirits of wine, for registering the lowest temperature during the night	2 50
775.	Thermometers, boxwood, self-registering, with mercury, for registering the greatest amount of heat during the day	3 50
775½	Thermometers, same as No. 775, but finer finish and elongated tube	4 50
776.	Thermometers, tin cases, with red spirits of wine instead of mercury, for very low temperatures, same price as those with mercury, Nos. 750 to 755. These have the advantage of being more easily seen than mercury, but they must be kept in the shade during warm weather, as spirits of wine boil at 128° Fahrenheit	

777. Thermometers, churn for dairymen..... $ 40
778. " " " with red spirits of wine..... 50
779. " brass, for salometer cup of sea steamers..... 3 00
780. " Axilliary, or Surgeon's Thermometer, with ivory scales, 3 inches long, bent tube, to place under the tongue or arm, divided to 5th of a degree, in neat morocco case..... 4 00
781. Thermometers, same as No. 780, with the addition of another thermometer for testing the temperature of the room..... 6 00
782. Thermometers, rosewood or mahogany cases, glass fronts, each, 2 50 to 3 50
783. ' bronzed stands, for the mantel, a large variety of different patterns.....1 75 to 12 00
784. Thermometers, pedestal, ivory scale, 4 to 8 inches long, ebony or mahogany base, glass shades, graduated with Fahrenheit and Reaumur scales.....2 50 to 6 00
785. Thermometers, distillers, with wood back, scale 12 inches long, graduated to 220°..... 2 25
786. Thermometers, distillers, with iron back, scale 12 inches long, graduated to 220°..... 2 50
787. Brewer's Thermometers, 14 inches long, brass scale, with cup, so that a portion of the liquor is retained..... 3 00
788. Thermometers, plate glass, 10 inch scale, with brackets to fasten outside of the window, so as to be seen without raising the window—a very fine article.....5 00, 6 00 and 7 00
789. Pocket Thermometers, porcelain scale, round dial, in papier mache cases..... 3 50

The Fahrenheit scale for Thermometers, is the one most used in this country, Reaumur and Centigrade being used entirely in Europe. To enable persons accustomed to use these scales to find the corresponding degree, I give the following table:—

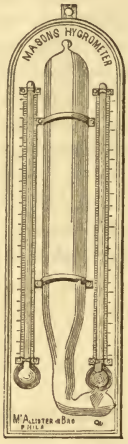
To convert Fahrenheit to Centigrade, deduct 32 and divide by 1.8.

To convert Centigrade to Fahrenheit, multiply by 1.8. and add 32.

To convert Fahrenheit to Reaumur, deduct 32, multiply by 4, and divide by 9.

To convert Reaumur to Fahrenheit, multiply by 9, divide by 4, and add 32.

Hygrometers & Hydrometers.



800.

802.

800. Mason's Hygrometer; for showing the humidity of the atmosphere: it consists of two thermometers placed side by side, the bulb of one being kept constantly wet by water from the glass fountain between the thermometers. The only reliable hygrometer, and very easily managed; with directions and tables, ... $4 50

801. Vapor Index. Lippincott's Vapor Index; a psychrometric calculator or aid for readily determining the amount of humidity present in the external atmosphere, or in the air of churches, lecture-rooms, hospitals, conservatories, &c., by facilitating the use of the wet and dry bulb thermometers or August's Psychrometer, commonly termed Mason's Hygrometer,..... 2 00

This movable table or index is capable of upwards of 14,000 combinations, and is highly recommended by Professor Henry and others, as being very convenient and accurate for the purpose intended.

802. Glass Hydrometers for Liquor,..... 50
803. " " " Syrup,..... 75
804. " " " Alkali,..... 75
805. " " " Acid,..... 1 00
806. " " " Acid, with Thermometer attached,..... 2 00
807. " " " Concentrated Acids,..... 1 00
808. " " " Salt, ... 75
809. " " " " for sea steamers,..... 1 25
810. " " " Oil,..... 75
811. " " " Coal Oil, N. Y. Petroleum Association Scale, ... 1 00

812. Glass Hydrometers for Coal Oil, N. Y. Petroleum Association Scale, with Thermometer,..... $3 00
813. " " " Beer,..... 75
814. " " " Bark,..... 75
815. " " " Vinegar,..... 75
816. " " " Bleach, for paper makers..... 1 25
817. " " " Milk, Lactometers, for detecting the quantity of water with which milk, furnished in cities, is frequently adulterated,.... 75
818. " " " Tralles' and Richter's Scales, with Thermometers enclosed for Alcohol,..... 3 00
819. " " " Twaddles, for Dyers and Calico Printers, Nos. 1, 2, 3 and 4, 5 and 6, each..... 75
820. Chemists' Hydrometer, for all liquids lighter than water, ranging from 10 to 70 Beaume, with scale of corresponding Specific Gravities (1,000, 0,700) attached—*very delicate*, warranted correct..... 2 00
821. Chemists' Hydrometer, for all liquids heavier than water, ranging from 0 to 70 Beaume, with scale of corresponding Specific Gravities (1.0069, 1,9333) attached—*very delicate*, warranted correct..... 2 00
822. The above Instruments in a handsome morocco case, with Thermometer enclosed in glass, and glass jar..... 8 00
823. Alcoholometers, for testing the proof of spirits, consists of a Glass Hydrometer, with N. Y. and Tralles' U. S. Scale, tin case and ivory Thermometer, including Book of Calculations, by Prof. McCullough, of the U. S. Revenue Department..... 6 00
824. " Same No. as 823, but has copper case in place of the tin..... 7 00
825. " Extra Thermometers for the above..... 4 00
826. " Alcoholometer..... 1 25
827. " Genders, N. Y. Hydrometer made of silver, copper case, and Thermometer packed in neat walnut case, with book..... 22 00
828. U. S. Revenue Alcoholometer, Tralles' Scale..... 5 00
829. Same as No. 828, packed in a neat Mahogany Box, with lock and key, and tall glass jar for testing, with book..... 10 00
830. Tagliabue's Pyrometer, for testing the Explosiveness of Coal Oil, copper case, Lamp, Hydrometer and Thermometer..... 6 00
831. Same as No. 830, but made of tin..... 4 50
831½. Urinometers for Physicians, with Specific Gravity Scale..... 1 50
" " " in cases with glass jar, each..... 2 00
" " " in morocco cases with graduated glass measure..... 3 00
" " " in morocco cases with graduated glass measure and thermometer..... 5 00

Mercurial Barometers.

832. Walnut case, 33 inches long, open in front, with Thermometer and Index..... $ 6 00

833. Walnut case, 33 inches long, close front, with Thermometer and Index..... 8 00

834. Handsome walnut case, ivory face, two Index hands, rack adjustment, large Thermometer..... 25 00

Mercurial Barometers cannot be sent by Express, nor will they bear handling, for this reason—I do not recommend them. No Barometers sent by Express until paid for, and then entirely at the purchaser's risk.

Aneroid Barometers.

Fig. 1.

Fig. 1 represents the external appearance of the instrument. It is four inches and three-quarters in diameter across the face, and one inch and three-quarters in thickness. The pressure of the atmosphere is indicated by a hand pointing to a scale, which is graduated to correspond with the common barometer: thermometers are placed on the face, one of which is essential.

Fig. 2 represents the internal construction as seen when the face is removed, but with the hand still attached. *a* is a flat, circular box made of some white metal, exhausted of air through the short tube *b*, which is subsequently made

air-tight by soldering; the upper and lower surfaces of the box are corrugated in concentric circles, which gives it greater elasticity; and the box is fixed to the bottom of a metallic case, which encloses the mechanism of the whole instrument. In the centre of the *upper* surface of the elastic box, is a solid cylindrical socket *x*, about half an inch high, to the top of which the *principal lever*, *c*, *d*, *e*, is attached; this lever, which brings the box into a state of tension by separating the surfaces, rests partly on a spiral spring *d*, and partly on two fulcrums having knife-edges, with perfect freedom of motion; the end *e* of the large or principal

Fig. 2.

lever is attached to a second lever *f*, from which a fine watch-chain *g* extends to *h*, where it works on a drum attached to the arbour of the hand; a hair spring at *h*, the attachments of which are made to the metallic plate *i*, regulates the motion of the hand.

As the weight of the atmosphere is increased or diminished, so is the surface of the corrugated elastic box depressed or elevated, as is also at the same time the spiral spring *d*, upon which the principal lever rests; and this motion is communicated through the levers to the arbour of the hand at *h*. The tension of the box in its construction is equal to 44 lbs. At the back of the Aneroid is a screw to adjust the hand to the height of any mercurial barometer: for comparative observations the Aneroid must be placed in the position for which the adjustment is made.

The word ANEROID is derived from the Greek ALPHA, NEROS EIDOS, meaning a form without fluid. The Aneroid Barometer is the most simple, beautiful and accurate instrument yet invented to indicate atmospheric changes. It is more accurate than the Mercurial Barometer, more convenient, more portable, and not so likely to get out of order. They are almost entirely used by the U. S. Coast Survey, and are peculiarly adapted to Travellers and Nautical use. They are also a very useful and ornamental instrument for a Parlor, Hall or Library.

To ascertain with accuracy the state of the weather, it is also necessary to use a Hygrometer, such as No. 800.

The Barometer is a very useful instrument for ascertaining elevations. To enable persons unacquainted with the mode of measuring, I give below a table for that purpose. I recommend the Aneroid Barometer as far preferable to any other kind, they are so portable, and can be sent anywhere by Express, with perfect safety.

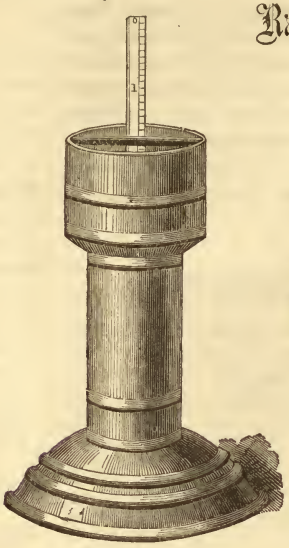
The height of the Atmosphere being assumed at 27.500 *feet, with the Barometer at* 30.00 *inches, and the Thermometer at* 55° *of Fahrenheit, the following Table of Elevations has been computed, answering to the corresponding depressions of the Mercury in the Barometer.*

Height of the Barometer.	Feet.	Height of the Barometer.	Feet.
in.		in.	
30.0	0	27.3	2592
29.9	92	27.2	2692
29.8	184	27.1	2793
29.7	276	27.0	2895
29.6	368	26.9	2997
29.5	462	26.8	3099
29.4	556	26.7	3201
29.3	650	26.6	3304
29.2	744	26.5	3406
29.1	838	26.4	3511
29.0	933	26.3	3615
28.9	1028	26.2	3719
28.8	1123	26.1	3824
28.7	1219	26.0	3926
28.6	1315	25.0	5000
28.5	1411	24.0	6111
28.4	1508	23.0	7263
28.3	1605	22.0	8462
28.2	1702	21.0	7907
28.1	1799	20.0	11000
28.0	1897	19.0	12345
27.9	1996	18.0	13750
27.8	2095	17.0	15214
27.6	2194	16.0	16740
27.5	2392	15.0	18335
27.4	2491	10.0	27500

Each person purchasing a Barometer will receive GRATIS a Copy of Belville on the Barometer, and Dent on the Barometer, two valuable works.

835. Pocket Aneroid Barometers, of various styles and patterns $16 00 to 30 00
836. Aneroid Barometer, 5 inches diameter, and 2½ inches thick, card board dial 13 50
837. Aneroid Barometer, 6 inches diameter, and 2½ inches thick, card board dial and open face, showing the working of the barometer. 17 00
838. Aneroid Barometer, 5 inches diameter, 2½ inches thick, enamelled metal face and thermometer 16 50
839. Aneroid Barometers, 12 inches diameter, enamelled paper face.... 35 00
840. Aneroid Barometer, 12 inches diameter, enamelled paper face and thermometer 40 00

Rain Gauges.



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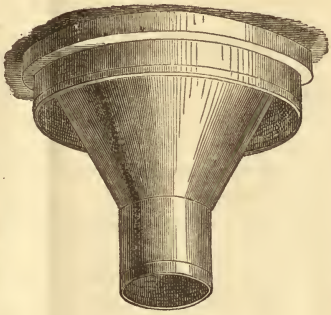
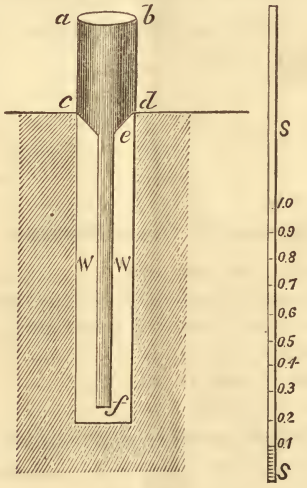


842

841. Rain Gauge, japanned tin, with graduated float, registers to the 20th of an inch..... $3 00

842. Rain Gauge, japanned, with glass graduated tube for measuring, graduated to 10ths..... 4 50



843

The Smithsonian Rain Gauge.

843. The Smithsonian Rain Gauge, made entirely of Brass. This Gauge has been adopted by the Smithsonian Institution and U. S. Patent Office, and is the most simple in its construction of any now in use. It is furnished with a graduated scale which reads to tenths and hundreths of an inch; also a wooden cylinder to insert permanently in the ground for the protection and ready adjustment of the instrument. A printed description, and directions for use, accompany each. Price..... $5 00

Specific Gravity Apparatus.

For ascertaining the Specific Gravity of Liquids, accurately adjusted to contain either 100 or 1000 grains, U. S. Mint standard, of pure distilled water at 60° Fahr.

844. 100 grain Bottle, with perforated stopper and brass counterpoise, weight in tin case..... 2 50

845. 1000 grain Bottle, with perforated stopper, and brass counterpoise weight in tin case..... 4 00

846. 1000 grain Bottle, not stoppered, with mark on the neck, brass counterpoise weight and case..... 1 75

Platina Points for Lightning Rods,

GLASS INSULATORS, STAPLES, CONNECTIONS, &c.

WHOLESALE AND RETAIL.

847. Platina Points, No. 01, each..... 5 00
848. " " " 1, " 3 50
849. " " " 2, " 2 50
850. " " " 3, " 1 75
851. " " " 4, " 1 50
852. " " " 6, " 1 25

Warranted Pure Platina.

853. Glass Insulator, per doz. 50 cents, each..... 05
854. Staples to drive, average seven to the pound, per pound..... 25
855. Staples to screw, average seven to the pound, per pound..... 25
856. Connectors, $\frac{5}{8}$ of an inch, each..... 05
857. Connectors, $\frac{3}{4}$ of an inch, each..... 08
858. Connectors, $\frac{7}{16}$ of an inch, each..... 05

Platina Points made to order of any style.

The well-known reputation of this house in the manufacture of Platina Points renders it unnecessary for any further remarks.

HINTS IN REGARD TO PUTTING UP LIGHTNING RODS.

In regard to the construction of Lightning Rods, it is doubtful if there is any improvement on the old plan of Dr. Franklin, with the exception of capping the rod with a point of pure platina. Platina possesses great advantages for such an adaptation, as it is the most difficult metal to melt, and does not rust or corrode, thus always presenting a clean surface.

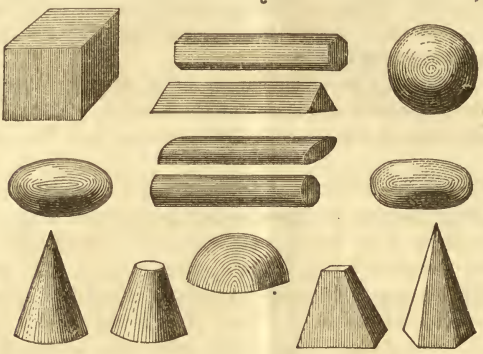
Our points are made of a tapering copper body, about six inches long, well gilt with pure gold to prevent the action of the weather, and tipped with solid platina; they have been in use for over twenty years, and have given general satisfaction.

It is all important that the connection of the point with the ground should be perfect. The iron used in the Lightning Rod may be half inch or five-eight inch diameter for the upper part of the Rod; but it is recommended that the lower part, from about two feet above the ground, should be somewhat stouter. The several lengths of which it is composed should be welded together, if possible, so as to make a continuous rod; where this cannot be done, it is recommended to have them screwed together. The old plan of connection with links is objectionable, as the links become rusty, and thus prevent actual contact. The upper end of the rod should extend at least five or six feet above the roof or stack of chimneys to which it is attached; *the lower end should extend into the ground five or six feet below the surface, that it may be always in damp earth, and should be led off in a direction from the building, and if possible should be conducted to a well or water.*

It is entirely a matter of conjecture as to what distance around will be protected by a Lightning Rod, and the safest plan, therefore, is to attach a rod to every exposed part of a large house or barn.

It is a singular but well-known fact that a long building or row of buildings, having a tin roof, require no lightning rod; the surface being so large that the Electric Fluid is carried off without doing any harm.

Geometrical Models, etc.

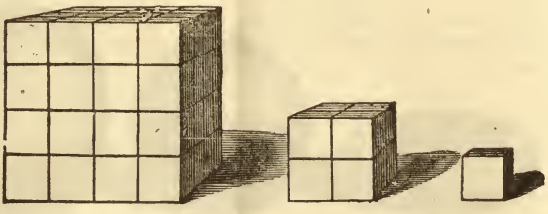


GEOMETRICAL SOLIDS.

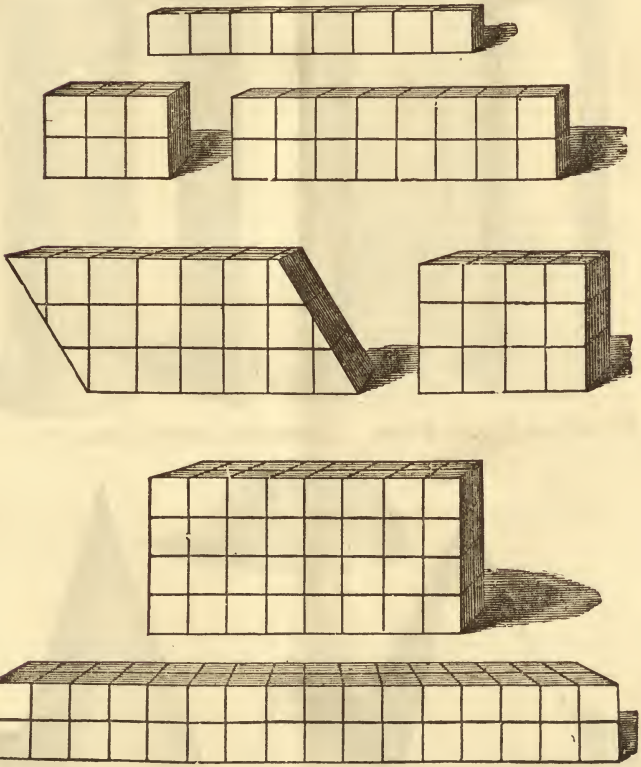
859. Geometrical Forms and Arithmetical Solids, consisting of the following forms: Oblate Spheroid, Sphere, Prolate Spheroid, Hexagonal Prism, Triangular Prism, Cylinder, Hemisphere, Pyramid and Frustum, Cone and Frustum, and a variety of Cubes and Parallelopipeds, and the Carpenter's Theorem. The whole set in a paper box..... $2 50

A SET OF GEOMETRICAL SOLIDS.

860. These will give pupils definite ideas of the shape of solids, far better than pages of description, and much more clearly than any drawings can. We know nothing better. For explaining the Rules for Mensuration or Solid Measurement, they afford the only proper means.

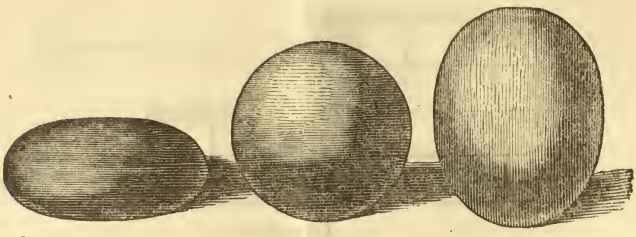


CUBES.

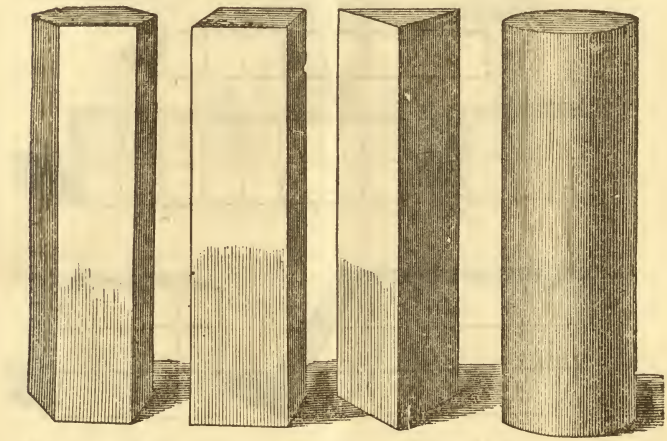


PARALLELOPIPEDS.

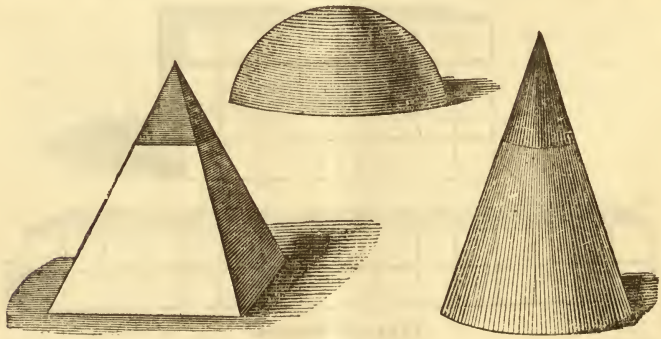
860.



OBLATE SPHEROID. SPHERE. PROLATE SPHEROID



HEXAGONAL PRISM. PRISM. TRIANGULAR PRISM. CYLINDER.

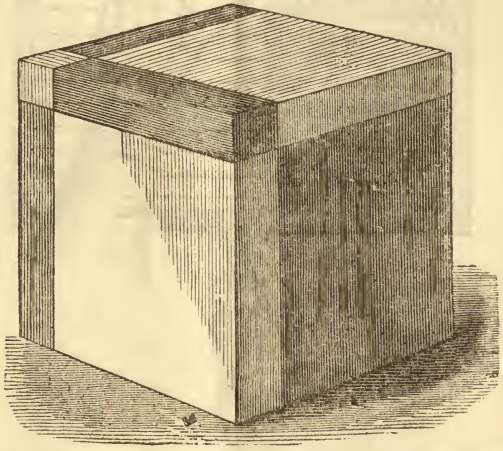


PYRAMID AND FRUSTUM. CONE AND FRUSTUM.

860.

860. Containing Sphere, Hemisphere, Oblate Spheroid, Prolate Spheroid, Pyramid and Frustum, Cone and Frustum, Cylinder, Triangular Prism, Rectangular Prism, Hexagonal Prisms, Cubes, Parallelopipeds, Rhomboid, the Carpenter's Theorem, in a neat wood box..... $1 00

862. A three inch hollow cube of glass, containing in the interior, handsomely formed, and of different colors, the Tetrahedron, Octahedron, Cube Octahedron and small cube. This is one of the neatest forms in which the cube can be presented and illustrated before a class. It is packed in a neat box..... 5 00



863.

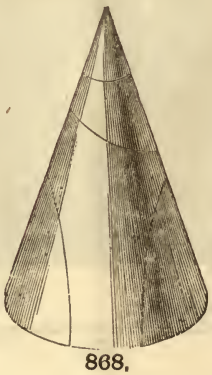
863. Cube Root Block, 2 inches square..... 40

864. Dissected Cube, in paper box..... 75

865. Dissected Cube, double, in paper box..... 1 00

866. Set of 64 one inch Cubes for numeration, cube root, &c., in box... 1 25

867 Dissected Trinomial cube, 27 pieces in box, with book..... 2 00



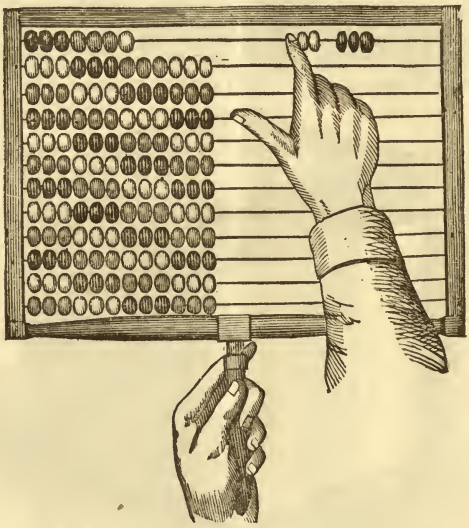
868.

868. Dissected Cone, 7 inches high, 4 inches base, with pins, showing the Circle, Ellipse, Parabolic and Hyperbolic Sections..... $2 50

869. Mathematical Paradox, or curious block, which fits exactly, and passes through a square, a circle and triangle..... 75

870. Dove tail puzzle..... 75

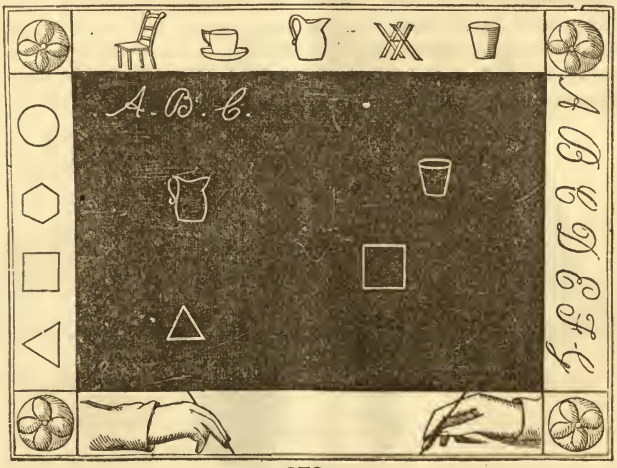
Numeral Frames.



871.

871. Numeral Frames with 100 balls..... 1 00

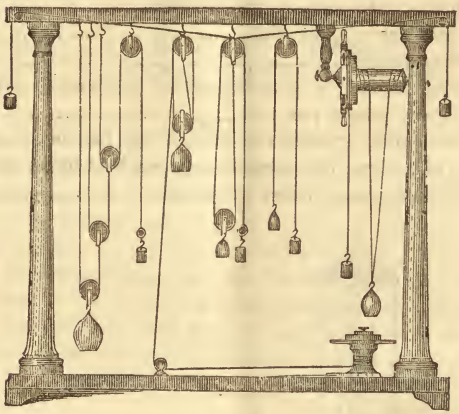
872. " " " 144 " 1 25



873.

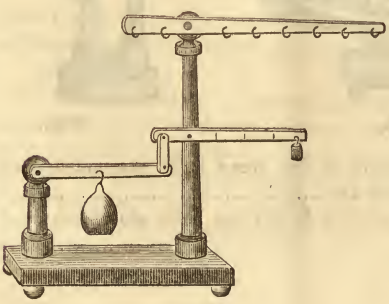
873. The Primary Drawing Slate teaches the right manner of holding the pen; gives copies of writing letters, both small and capitals; furnishes a variety of drawing copies, which may be much extended by purchasing the DRAWING BOOK, prepared to accompany the slate; answers every purpose of the ordinary slate, *and is* NOISELESS. Price according to size..... 40–50

Mechanical Powers.



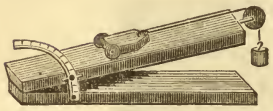
874.

874. Mechanical Powers, with four sets of Brass Pulleys, Counterpoises, Brass and Japanned Weights, Wheel and Axle in Frame, and Capstan..... $25 00

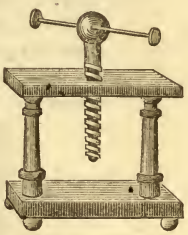


875.

877.



876.

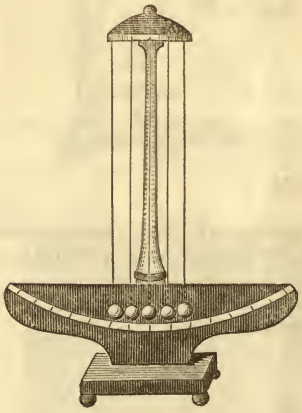


878.

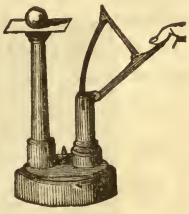
875. Simple and Compound Levers of Brass, with weights..... $8 00
876. Inclined plane, with carriage and weight..... 10 00
877. Wedge in two parts..... 1 00
878. Screw in frame..... 5 00

The above series, forming a complete set of mechanical powers, all mounted on mahogany stands, per set..... 45 00

879. A set of Mechanical Powers, consisting of the four most important systems of pulleys, two straight and one bent lever, wheel and axle, inclined plane, wedge and screw..... 30 00



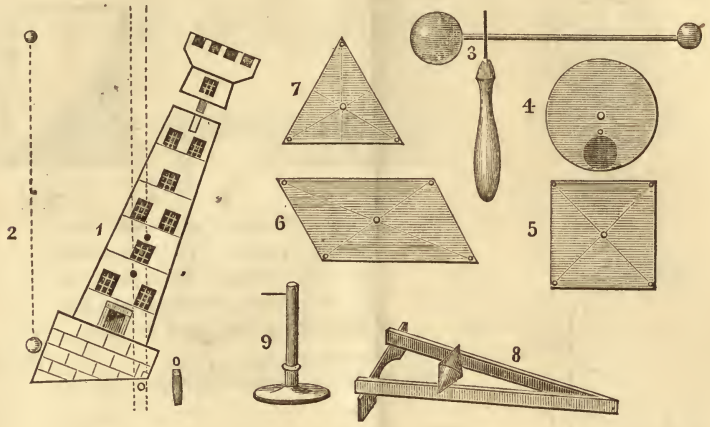
880.



882.

880. Collision balls, consisting of five ivory balls suspended from a frame with graduated arc..... 14 00
881. Collision balls, same as No. 881, but the balls are of boxwood.... 6 00
882. Inertia Apparatus..... 2 50

Centre of Gravity Apparatus.



883.

883. Set of 8 illustrations for Centre of Gravity, viz: 3 blocks of various figures, with centre of gravity and suspension; two balls, on rod, with centre of gravity; leaning tower of Pisa, with two centres of gravity; loaded wheel on stand, with centre of gravity and magnitude. Mechanical Paradox—a double cone appears to run up hill; Horseman balanced on two points. This set also includes a brass plumb cord and handle for supporting the various articles on centre of gravity..... $11 00

885.

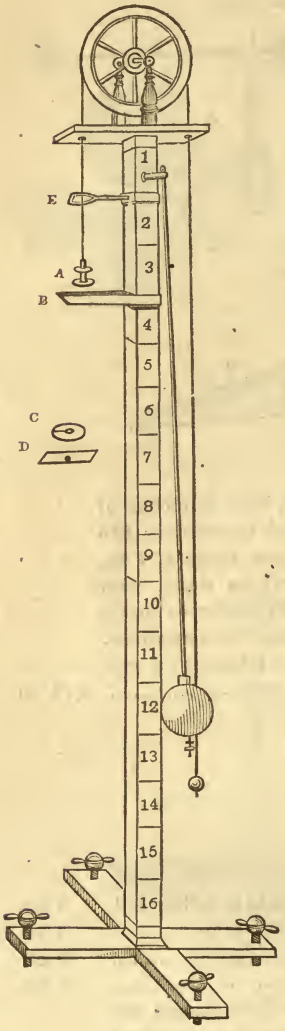
884. Mechanical Paradox—a double cone which appears to roll up hill. 1 50

885. A pair of Glass Plates, with handles for cohesion, per pair..... 1 60

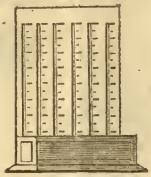
886. " Brass " " " " " 3 50

887. Pair of lead Hemispheres for cohesive attraction..... .... 1 50

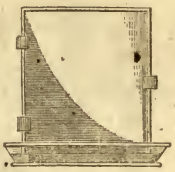
888. Philosophical Waltzers—one or two beautiful little images are attached to a glass lens, which, when placed upon a clean, wet plate, and the plate inclined, produce a rotary, progressive motion, illustrating centre of gravity..... .....50 and 75.



889



890.



893.

889. Atwood's Machine, graduated mahogany pillar, 8 feet, basement levelling screws, pendulum for seconds, slides, weights, etc., for illustrating the laws of falling bodies..... $32 00

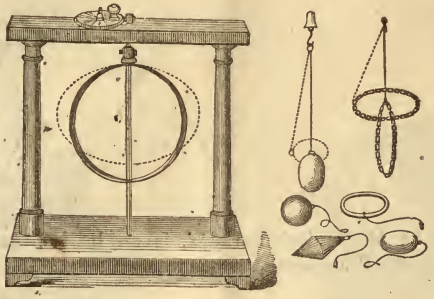
890. Capillary Attraction Tubes, set of six..... 1 25

891. Capillary attraction Tubes, set of six, with stand and water pan... 2 50

892. Capillary attraction plates, made of ordinary glass, for showing the Parabolic Curve, with pan..... 2 00

893. Capillary attraction Plates, same as above, but made of plate glass... .3 00

Centrifugal Forces, etc.



894.

894. Apparatus for Central and Centrifugal Forces, with eight illustrations—Sphere, Oblate Spheroid, Prolate Spheroid, Double Cone, Ring, Band, Chain and Glass with colored fluid; exhibits, in a beautiful manner, the causes of the planets revolving on their shortest diameters, the cause of their being flattened at the poles; the peculiar effect of rapid rotation upon the loose parts of a body; and a variety of other pleasing effects..... $13 75

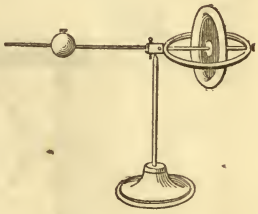
895. Prismatic Cylinder, for the recomposition of white light, to attach to the above..... 1 50

896. Centrifugal Railroad, three feet long with ball..... 5 00
To illustrate the fact that the momentum of a body descending a steep incline is sufficient to carry it over a vertical circular track, thus placing it completely upside down.

896½. Centrifugal Railroad, made of iron, 12 feet long, on wooden base, with handsomely painted chariot, in which a doll can be placed, and the fact of the chariot going completely upside down can be made visible to a much larger audience..... 30 00

The Gyrascope.

899.



897.

The Gyrascope, or Mechanical Paradox, is an instrument of very simple construction, beautifully illustrating various interesting movements of centrifugal force.

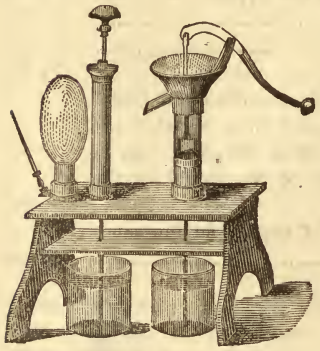
A wheel about four inches in diameter is attached to an axis about four inches long, the ends of the axis being supported in a circular band, on which, in a line with the axis, is a cap to rest on an upright point.

Rapid motion is given to the wheel by winding a cord around the axis, and suddenly pulling it off; the cap is then set on the point, and the instrument will revolve around the centre, sustaining itself at any angle at which it may be placed, and remaining thus as long as the wheel revolves rapidly. Suspended by a string, it will act as well as when supported on the point.

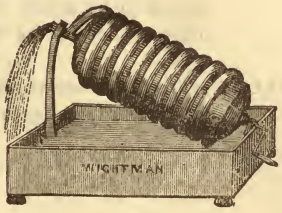
The Gyrascope with balance (No. 898) will revolve in one direction if underbalanced, in the opposite direction if overbalanced, and remain stationary when balanced.

897. Gyrascope, all brass, with 6 inch wheel, with arm and balance..... $16 00
898. Gyrascope, all brass, with 4 inch wheel, with arm and balance, finely finished..... 8 00
899. Gyrascope, common, without balance..... 2 00

Hydrostatics and Hydraulics.



900.



903.

900. Working Model of Force and Lift Pump, illustrating the Fire Engine, and the Lifting or House Pump, with glass barrels and air chambers, and lever handles, on one stand with water jars, $20 00

901. Working Model of Force Pump, on neat wood stand with water jar. The barrel of brass; condensing chamber of strong glass to enable the working of the valves to be seen..... 12 00

902. Working Model of the Lifting Pump, on neat wood stand with water jar; with glass barrel showing the working of both valves..... 10 00

903. Working Model of Archimedes' Screw Pump..... 5 00

904.

905.

904. Hydrostatic Paradox and Bellows, intended to show that the pressure of Liquids does not depend upon the volume contained in the vessel, but on the vertical height of the column..... $23 00

905. Tantalus Cup, illustrating the principle of the Syphon..... 2 00

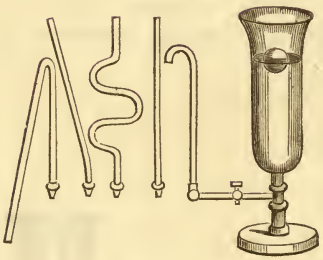
906. Glass Syphon, with Suction Tube..... 75

907. Glass Syphon, plain..... 25

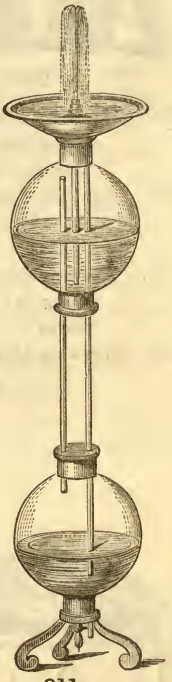
908. Brass Syphon..... 1 50

909. Wirtenburg Syphon. This instrument when once filled with liquid will remain so. One leg being immersed in a vessel of the liquid to be drawn off, it will escape from the other leg, in consequence of the additional pressure of the liquid in the vessel. 75

910. Apparatus for showing the Equilibrium of fluids, and the cause of Intermittent Springs..... 14 00



910.

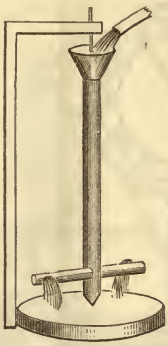


911.

911. Hero's Fountain of Glass, with brass mountings..... 18 00

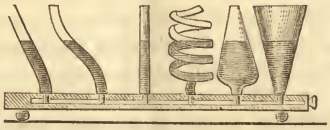
912. Hero's Fountain of Tin, with brass mountings..... 7 00

913. Hero's Fountain of Tin, small size..... 3 00



914.

914. Barker's Mill, 12 inches high..... $6 00
915. Balloon Jar, with Balloon, 15 inches high..... 5 00
916. Balloon Jar, with Balloon, 5 inches high..... 50
917. Bottle Imps; or Hydrostatic Figures with bottles..... 75

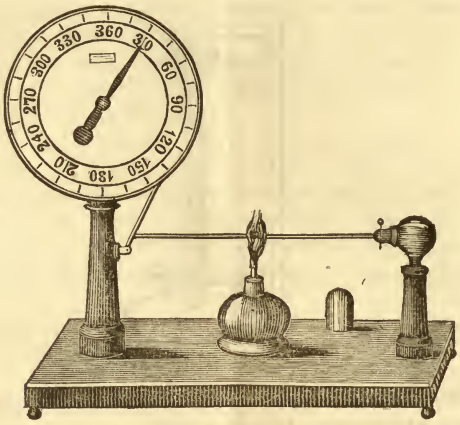


918.

918. Equilibrium Tubes, six forms, tin base..... 3 75
919. Working Model of Hydraulic Ram..... 10 00
920. Glass Model of Diving Bell, with lead ring..... 2 50
921. Glass Model of Diving Bell, with cap and tube..... 5 50
922. Model of Water Wheels, Overshot, Undershot and Breast, neatly made of Tin..... 8 00

Heat.

923. Pulse Glasses; the liquid in which appears to boil from the heat of the hand..... 1 00
924. Eolopile, or Ether Jet..... 40
925. Parabolic Reflectors, for Radiation of Heat, with iron ball, support and stand, to be used in the focus of the other mirror, made of planished tin, 12 inches in diameter..... 9 00

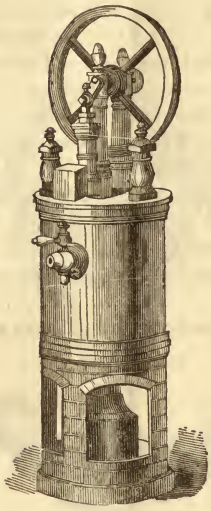


926.

926. Pyrometer, for testing the expansion of metals .....$6 50 and $9 00
927. Compound Bar, of Brass, Iron and for showing the unequal expansion of metals by the same heat..... 1 00
928. Brass Ball and Gauge Ring, for showing the expansion of metals in all directions, with Spirit Lamp..... 3 00
929. Conductometer, on stand, with spirit lamp, for showing the capacity of different metals to transmit heat; consists of 6 materials, each having wax or phosphorus in its extremity..... 4 50
930. Conductometer, with 6 different metals, with handle..... 3 00
931. Fire Syringe, 7 inch Cylinder, with box of tinder..... 3 00
932. Davy's Safety Lamp, same as those used by miners to prevent explosions from fire damp..... 8 50

933.

933. Aphlogistic or Flameless Lamp..... 1 50
934. Wire Gauze in Frame..... 75
935. Spirit Lamps, of Glass, with ground glass Caps.....50–75–1 00
936. Wollaston's Cyropherus..... 2 50
937. Blowpipes, Berzelius, with ivory mouth piece and platina point, with the different points made to separate..... 3 00
938. Blow Pipe, brass, with bulb..... 75
939. Blow pipe, plain..... 40



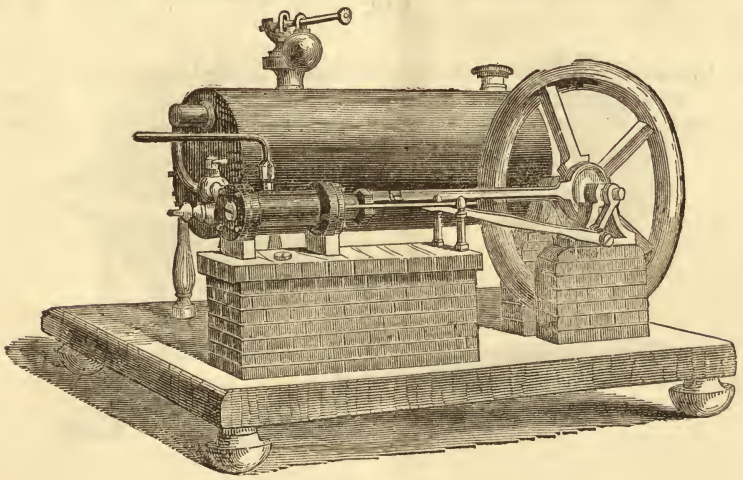
943.

940. Candle Bombs; when placed in the wick of a lighted candle, they explode with a report like a pistol, per doz..... 30

941. Revolving Steam Jet, of brass, illustrating Hero's Steam Engine, consists of a strong, hollow globe of brass, and two horizontal jets bent in the form of an **S**, the steam generated causes it to revolve rapidly, illustrating a direct acting rotary steam engine.....

942. Operating Model of High Pressure Steam Engine, oscillating cylinder, vertical tin boiler and spirit lamp..... 4 50

943. Same as No. 942, with finely finished stand and brass boiler..... 11 00



944.

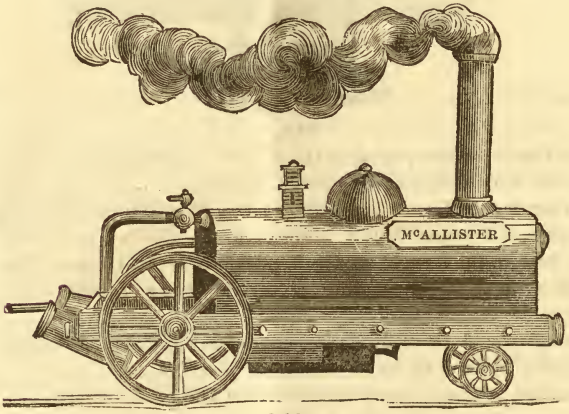
944. Operating Model of a High Pressure Steam Engine, with Horizontal Boiler, Cylinder 3 x 1 sliding valve, eccentric, iron fly wheel and tin boiler, tin spirit lamp, on wood stand..... $25 00

945. Operating Model, same as No. 804, but has Copper Boiler, Safety Valve, try cock, and finely finished in every respect..... 40 00

946. Sectional Model of a Low Pressure Steam Engine, made of pasteboard and wood. By means of a crank at the rear, every part is put in motion, the piston, valves, beam, wheel, and eccentric; it is about 11 inches square, and affords the best explanation for schools, and is very beautifully made..... 12 00

947. Sectional Model of Marine Engine for Steamboat, made same as 946..... 12 00

948. Sectional Model of a Locomotive, made same as 946..... 15 00



949.

949. Operating Model of a Locomotive, with tender attached, tin boiler, brass wheels..... 25 00

950. Same as No. 949, but with brass boiler, and finely finished..... 48 00

Astronomy and Globes.

951.

951. 18 inch globe, revolving, on bronzed pedestal stand, terrestrial or celestial $75 00

952. 12 inch globe, revolving, on bronzed pedestal stand, terrestrial or celestial 36 00

953

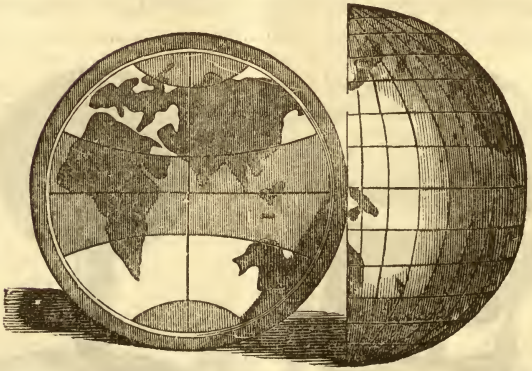
954.

953.	12 inch globe, revolving, on whole mahogany stand, terrestrial or celestial	$22 00
954.	12 inch globe, revolving, on semi mah'y stand, terrestrial or celestial,	20 00
955.	10 inch globe, revolving, on whole mah'y stand, " "	20 00
956.	10 inch globe, revolving, on semi mah'y stand, " "	15 00
957.	6 inch globes, revolving, on whole mah'y stand, " "	9 00
958.	6 inch globes, revolving, on semi mah'y stand, " "	5 00

The above globes are the best manufactured in the United States, they are all warranted.

TERRESTRIAL GLOBE.

959.



HEMISPHERE GLOBE.

960.

959. 5 inch Terrestrial Globe, on wood stand..... $2 50

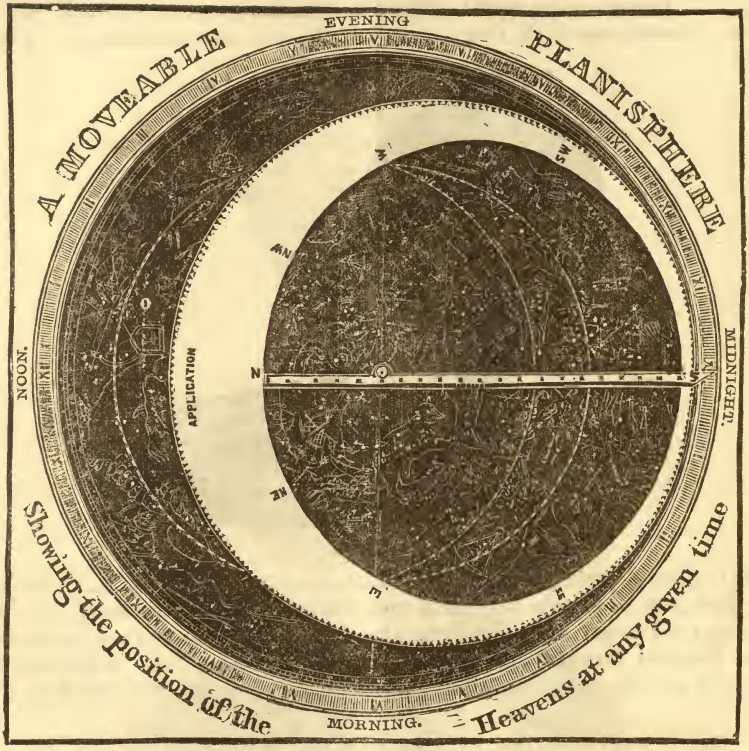
960. Hemisphere Globe. This supplies a want long felt, viz., an illustration which any child can understand, of the reason of the curved lines on a map, and shows how the flat surface is a proper representatation of a globe. Two hemispheres are united by a hinge, and when closed, a neat little globe is presented; when open, two maps are seen showing the continents as if through transparent hemispheres. 3 inch..... 1 25

961. Hemisphere Globe, 5 inch..... 2 50

961½

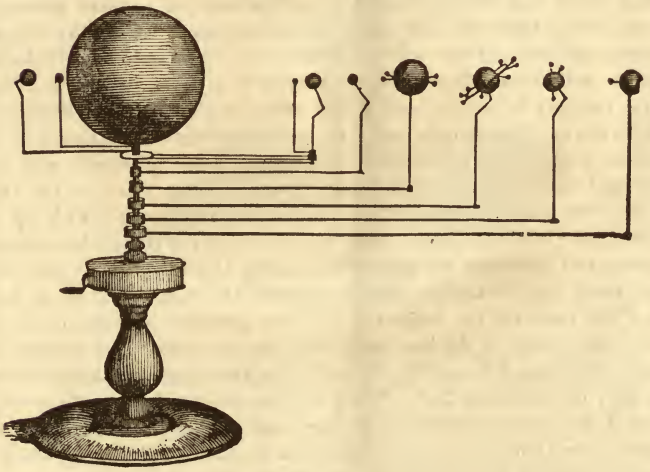
961½. Solar Telluric Globe..... 15 00

This is an apparatus combining both the geography of the earth and its diurnal and annual motions, showing the cause of the seasons, of the change in the length of days and nights and other interesting phenomena. A descriptive manual of thirty pages, containing thirteen problems, accompanies each globe.


A MOVEABLE
PLANISPHERE
EVENING
MIDNIGHT.
MORNING.
NOON.
APPLICATION
Showing the position of the Heavens at any given time

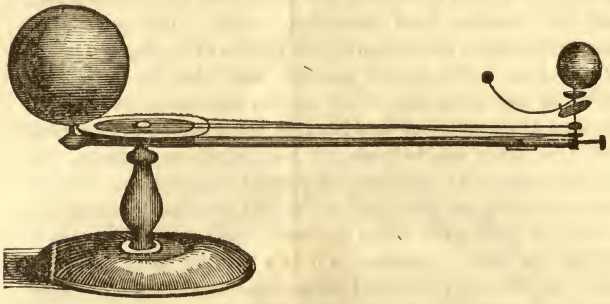
962.

962. Movable Planisphere, consisting of a map of the heavens projected on the plane of the equator, showing the position of the heavens at any given time throughout the year, with the constellations and the principal fixed stars then visible. The sun's place among the stars is marked on the ecliptic for every day and month of the year. The moon's position may also be found. By bringing any given star to the eastern or western point of the horizon, the position of its rising or setting may be observed, while the index will indicate the time of this phenomena with an accuracy quite sufficient for general observations. It furnishes a cheap, portable, and sufficiently accurate substitute for a celestial globe or a series of charts. It occupies a space of 16 inches square. Attached to it is a description of the principal constellations and fixed stars composing them. The committee on Science and the Arts of the Franklin Institute of Pennsylvania unhesitatingly recommended this map to public patronage Plain, $2 50, colored.....$3 00 and $3 50



963.

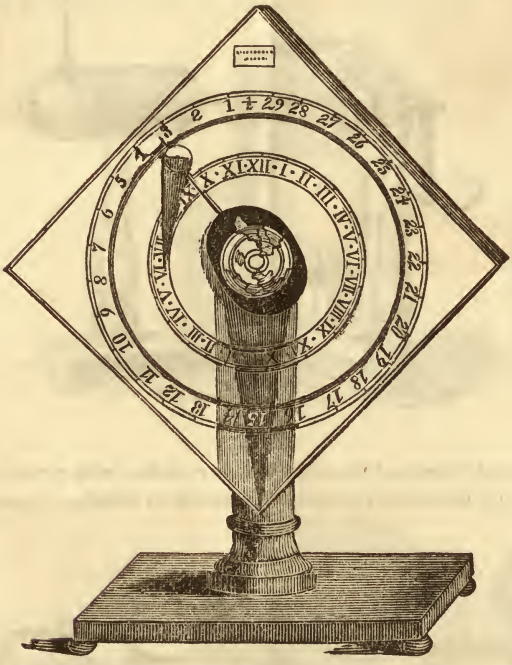
963. Orrery or Planetarium, of brass, on finely finished brass stand, Gilt Sun, crank and rack work, and all the planets from Mercury to Neptune, with their Moons and relative positions to the Sun..... 17 00



964.

964. Tellurian or Season Machine, showing all the phenomena of the seasons, &c..... $13 00, $15 00 and $17 00

The Sun, Earth and Moon are shown; it illustrates in a clear manner the phenomena arising from the annual and diurnal motion of the earth; change of the seasons; revolution of the moon round the earth, moving in an orbit inclined to that of the ecliptic and illustrating the subject of eclipses, the gilt ball representing the sun may be removed and a lamp substituted in its place, illuminating the earth in one hemisphere only, and the moon differently in its various positions. Four distinct motions are given to this instrument, three by wheels with cords passing round them, and one with toothed wheels, also a screw at the end to tighten the cords when required; the globe is distinctly marked with the continents, seas, &c.; the axis of the earth is inclined to the ecliptic in an angle of 66½ degrees, and preserves its parallelism during the whole of its revolution; when the north pole is turned directly towards the sun, the globe is in the position of the earth for the longest day in our northern hemisphere, or June 21st. Turn the handle of the instrument until the earth and moon have revolved half round the sun, and the north pole is directed from the sun, and we have the shortest day, or December 21st. There are two intermediate positions in the revolution of the globe answering to the positions on March 21st and September 21st, when the two poles are equally exposed to the sun, and when the days and nights are of the same length all over the earth. The phases of the moon are also clearly exhibited by this instrument; when the moon is between the earth and sun, we call it new moon, the illuminated part being turned from us; but when the earth is between the sun and moon, we call it full moon, the illuminated part being then turned towards us; in the intermediate positions we have the first and last quarter of the moon.



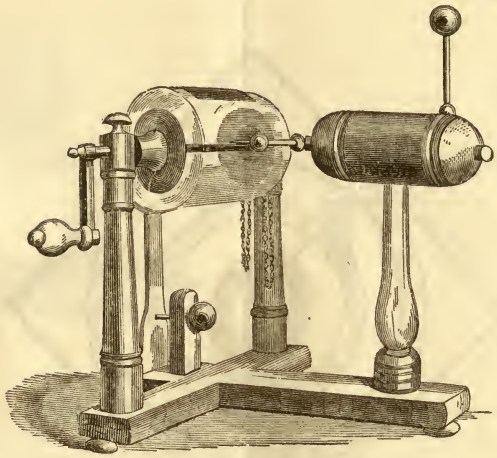
965.

965. Tide Dial, 15 inches diameter, which, by turning a crank, illustrates the daily change in the Tides, the Diurnal motion of the Earth, cause of Eclipses, and shows the Earth's Umbra and Penumbra; with Gilt Sun, on stand $9 00

969. Holtz's Electrical Machine. 20 inch plate..... 115 00

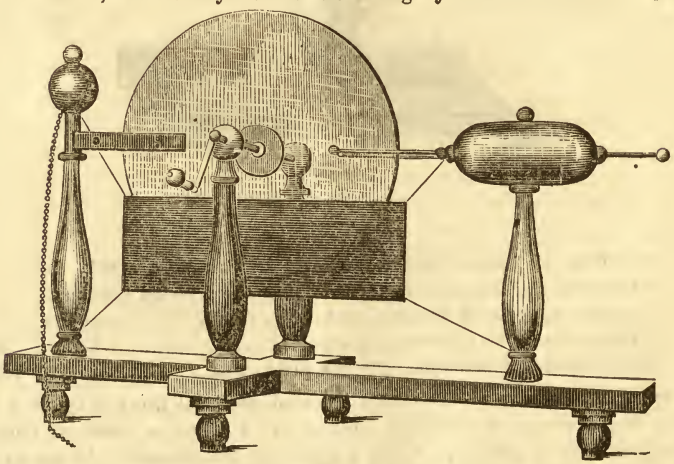
These machines have recently been invented, and will throw a spark, 5 to 6 inches; the quantity of electricity evolved is 10 times as great as from an ordinary machine of same size, filling a gallon jar in 5 seconds. All the experiments can be performed with it, and large size Geisler Tubes may also be shown.

Electrical Apparatus.



970.

970. Cylindrical Electrical Machine, 5 inch cylinder, with prime conductor; handsomely mounted in mahogany stand..... $25 00



972.

971. Plate Electrical Machine; 12 inch plate nicely finished, japanned prime conductor, oiled walnut stand..... 25 00

972. Plate Electrical Machine; plate 16 inches in diameter, finely polished brass prime conductor, glass pillars, and handsomely finished oiled walnut stand..... 35 00

973. Plate Electrical Machine; plate 20 inches in diameter.. ..... 45 00

974. " " " " 24 " " " 70 00

975. " " " " 30 " " " 150 00

975½. " " " " 36 " " " 185 00

976. Plates for Electrical Machines, circular, prepared for mounting, the centres drilled and edges ground 12, 16, 20, 24, 30 and 36 inches diameter. Prices are continually changing, and will be given by letter.....

977.

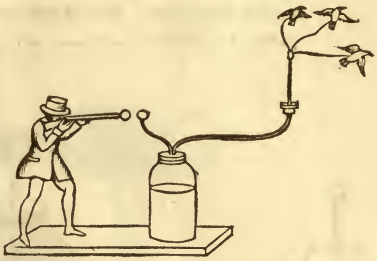
992.

994.

977.	Leyden Jars, pint	$ 1 50
978.	" " quart	2 00
979.	" " half gallon	2 75
980.	" " gallon	3 50
981.	Electrical Battery, containing 4 pint Jars, in a neat Walnut Box	7 00
982.	" " " 6 " " " " " "	12 00
983.	" " " 4 quart " " " "	11 00
984.	" " " 6 " " " " "	16 00
985.	" " " 12 " " " " "	28 00
986.	" " " 4 half gal. Jars, in a neat Walnut Box	14 00
987.	" " " 6 " " " " " "	20 00
988.	" " " 12 " " " " " "	38 00
989.	" " " 4 one " " " " "	18 00
990.	" " " 6 " " " " " "	28 00
991.	" " " 12 " " " " " "	50 00
992.	Lightning Jar, quart	2 00
993.	" " pint	1 50
994.	Spotted or Diamond Jar, quart on both sides	5 00
995.	Electrometer Jar, quart	2 50
996.	" " pint	2 00
997.	Leyden Jar with movable coating to explain the Leyden Jar	3 50
998.	Universal Discharger, with adjusting table and press, to enable persons to pass a charge through apples, oranges, loaf sugar, etc., etc., which are made luminous by so doing	10 00

999.

1003.

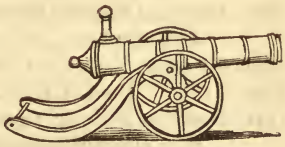


1007.

999.	Jointed Discharger, with glass handle	$ 5 00
1000.	Plain " " "	2 25
1001.	Metallic Plates, on adjusting stand for dancing images	2 50
1002.	" " " insulated " " " "	6 50
1003.	" " to suspend from the prime conductor	1 25
1004.	Pith Images, for dancing plates, each	50
1005.	Pith Balls, per doz	20
1006.	Pith Birds, per doz	1 25
1007.	Electrical Sportsman, with jar and birds, on a neat stand	6 00
1008.	Electrical Sportsman, with electrometer jar	4 00
1009.	Bennet's Gold Leaf Electrometer, with Volta's Condenser attached	12 00
1011.	Bennet's Gold Leaf Electrometer	6 00
1012.	Coulomb's Tortion Electrometer	$16 00 to 30 00
1013.	Quadrant Electrometer, Boxwood Scale	2 50
1014.	Lane's Discharging Electrometer	5 00
1015.	Pith Ball Electrometer	4 50
1016.	Saussure's Electroscope	3 25
1017.	Chime of 5 Bells, on insulated stand	9 50

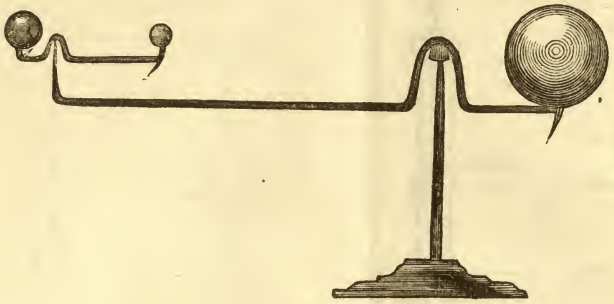
1018.

1022.



1033.

1018.	Chime of 3 Bells, to suspend from the Conductor	$3 00
1019.	" 2 " " " "	2 00
1020.	" 2 " one of them being connected with the interior of a Leyden Jar	4 50
1021.	Chime of 3 Bells, connected in the same style, French manner of mounting	6 00
1022.	Aurora Tube (two sizes,) 3 feet long	8 00 and 9 50
1023.	Luminous Flask, with brass cap and point	4 00
1024.	Spiral or Diamond Tubes, 1, 2 or 3 feet long	3 00, 4 00 and 5 00
1025.	Set of Spiral Tubes, mounted on stand	10 00
1026.	Insulated Stools	5 00
1027.	Electrical Flier or Whirl, with Rod	1 25
1028.	Set of 3 Fliers on Trident	3 50
1029.	Electrical Fox Chase, 6 Horsemen	4 00
1030.	" See Saw with Figures	5 50
1031.	" Swing	
1032.	" Bucket	1 75
1033.	" Cannon, Brass, on brass wheels	8 00
1034.	" Pistol, of brass	2 50
1035.	" Pistol of tin	1 25
1036.	" Spider	75



1037.

1040.

1037. Electrical Orrery, representing the motion of the Sun, Earth and Moon..... $4 50

1038. Electrical Powder Bombs, in which Gunpowder will be exploded with certainty..... 2 50

1039. Electrical Mortar and Ball, for firing with Oil..... 3 25

1040. " Head of Hair..... 1 50

1041. Luminous Picture; figures of a Vase, Bottle, etc., arranged upon glass plates with pieces of tin foil, which are rendered luminous by passing the electric spark through them..... 2 00

1042. Magic Picture, mounted on wood frame, when charged the frame is handed to some person who is requested to touch the picture, in doing so they will receive a shock..... 3 00

1043. Miser's Plate, use same as the magic picture, except that a coin is placed on the plate, and the holder is requested to take it off.... 2 50

1044. Luminous Words, such as Fire, Light, Franklin, etc.....3 00 to 6 00

1045. Mahogany Model of the Gable-end of a House, for illustrating the effects of perfect and broken Conductors..... 2 50

1046. Mahogany Model of a Thunder House, hinged, to be blown down by a Gas Pistol within, also illustrating the preceding..... 8 00

1047. Mahogany Model of an Obelisk, which is thrown down by the simple discharge of a highly charged jar..... 4 75

1048. Japanned Tin Fire or Lightning House—this is a house of tin with a ball of cotton in it, which is set on fire by an electric spark—illustrating the effects of Lightning..... 6 50

1049. Brass Ball, on stand, for igniting Cotton and Rosin..... 1 50

1050. Apparatus for the ignition of Phosphorus..... 5 00

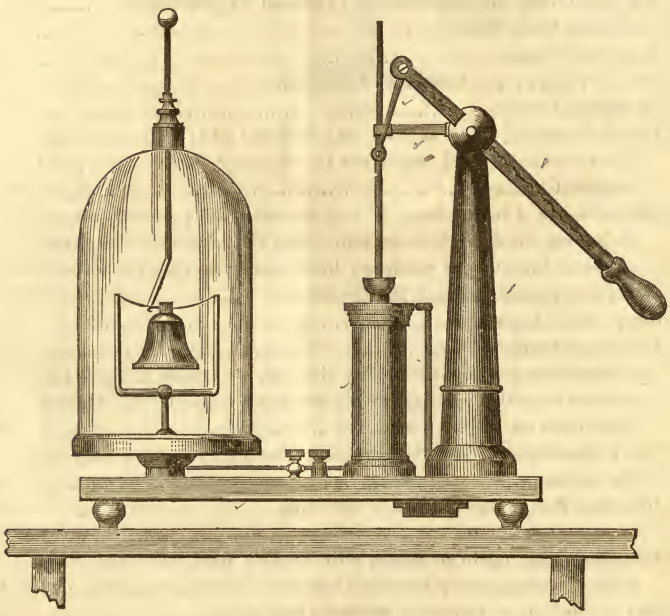
1051. Ether Cup, with handle..... 1 00

1052. Egg Stand—for passing a spark through eggs..... 2 00

1053. Electrophorus..... 6 00

1055. Atmospheric Leyden Jar, with crooked stem and ball for suspension, and movable ring with points $3 25
1056. Double Leyden Jar 4 75
1057. Lane's Discharging Electrometer 3 25
1058. " " " mounted on half gallon jar 6 00
1059. Induction Conductors, Japanned Tin, each 3 00
1060. " " Brass, each 5 00
1061. Rat killing tube, with brass screw caps, balls and sliding rods 6 00
1062. Electrical Mill, showing rotation produced by Electricity 1 25
1063. Revolving Glass Globe 4 00
1064. Electrical Swan 50
1065. Tissue Figure; or, Electrical Doll 1 50
1066. Radiating Feather 2 00
1067. Hero's Fountain, same as Nos. 911, 912 and 913; if used in the Electrical Stool, will throw the jet of water much higher, and render it luminous .....
1068. Geisler tubes, 4 inches long, of various beautiful patterns, which, on having the air exhausted and filling them with various gases, solids or liquids, are rendered luminous by having the electric current passed through them, each 1 50
1069. Gunpowder Apparatus 4 50
1070. Electrical Inclined Plane 6 00
1071. Apparatus for passing Electricity through a vacuum and gases of various densities, consists of a glass globe capped, with Sliding Rod, Balls and Stop Cock 9 50
1073. Biot's Hemispheres for showing that Electricity resides only on the surface 8 00
1074. Directing Rod, made to slide, 3 feet long 3 25
1075. " " " 4 " " 5 00
1076. Electrical Egg, made of Glass, with sliding Rod, Balls and Stop Cock, showing a very beautiful effect of Electricity in Vacuo ... 12 00
1077. Rod of Shellac, to illustrate resinous excitation 2 00
1078. Rod of Glass, for illustrating vitreous excitation 1 00
1079. Brass Chain, for connecting, per yard 20
1080. Amalgam, per box 40
1081. Brass Balls, in Stems, for Leyden Jars, each ..... $1 00 to 2 50
1082. Tin Foil, for coating Leyden Jars, per square foot 15

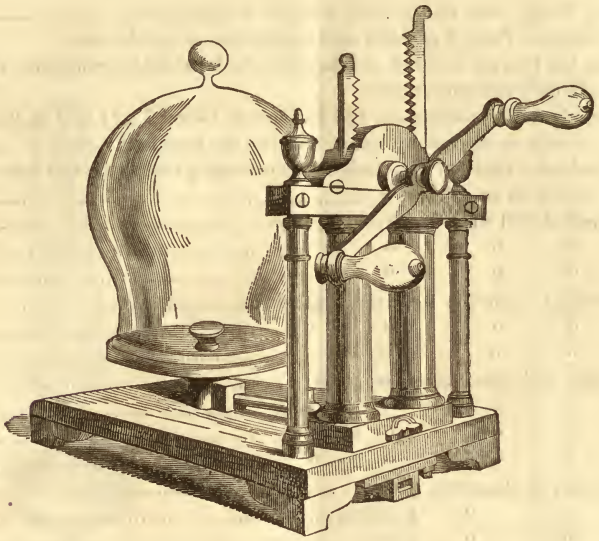
Pneumatics.



1090.

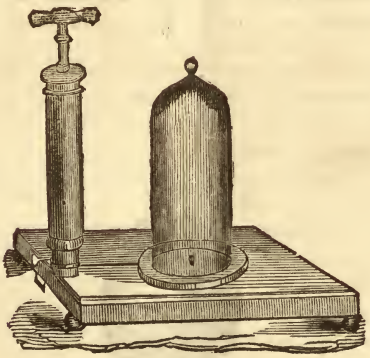
1090. Lever Air Pump, basement of mahogany, polished, plate 8 inches, barrel 7½ x 2 inches, with improved valves and exit tube. The basement is 20 x 14 inches, the plate is elevated but 5 inches from the table, giving great steadiness to the bell glass, which is also in a most convenient position for use, while the lever is conveniently placed for ease of action. As high degree of rarifaction is obtained as by any other size, and all experiments such as freezing water, etc., are well performed by its use..... $50 00

1091. Air Pump, same as No. 1090, with Mercury Gauge..... 55 00



1092.

1092. Double Barrel Air Pump, barrel 7 inches long, $1\frac{5}{8}$ inch diameter, plate 7 inches diameter; 2 Receivers and Clamp..... $60 00



1093.

1093. Single Barrel Air Pump, a very neat, good and convenient article, neatly furnished, barrel inclines at an angle for greater convenience in using, barrel $7\frac{1}{2}$ x $1\frac{1}{2}$ inches diameter, plate is elevated with Stop Cock underneath, and is $7\frac{1}{4}$ inches in diameter..... 24 00

1094. Air Pump, same as No. 1093, but the plate is only $6\frac{3}{4}$ inches in diameter..... 22 00

1095. Air Pump, same as No. 1093, but the plate is only 6 inches in diameter..... 18 00

1096. Air Pump, same as No. 1093, without the Stop Cock..... $15 00

☞ *Each Air Pump is provided with one Receiver of suitable size.*

All the Air Pumps, are well and handsomely furnished throughout, every part being made with the utmost care.

1097. Double Acting Condenser, and Exhauster, barrel 7 x 1¼ inches, the change is effected by simply turning the base half round..... 14 00

1098. Condenser barrel, 7 x 1½ inches—by reversing the piston and valve it acts as an exhauster..... 8 00

1099. Swelled Bell Glass Receiver, 2 gallon..... 3 50

1100. " " " 1 " 2 50

1101. " " " ½ " 1 75

1102. Swelled Open Top Receiver, 2 gallon 3 50

1103. " " " 1 " 2 50

1104. " " " ½ " 1 75

1105. Plain Bell Glass Receiver, quart, ... 80

1106. " " " ½ gallon, ... 1 25

1107. " " " 1 " 2 00

1108. " " " 2 " 2 75

1109. Open Top Receiver, quart, ... 1 00

1110. " " ½ gallon,..... 1 50

1111. " " gallon, ... 2 50

1112. Ground Glass Cover,..... 80

1113. Sliding Rod Receiver, 1 gallon, with hook and ball,..... 5 00

1114. Tall Bell Glass Receiver,..... 2 75

1115. Expansion Fountain, ... 5 00

1117.

1118. 1119.

1121.

1116. Bell Glass Receiver, with Cap and Stop Cock, gallon..... 5 00

1117. Apple Cutter, of brass..... 2 50

1118. Hand Glass..... 1 25

1119. Bladder Glass..... 1 25

1120. Double Hand Glass, or Philosophical Hand Cuff..... 5 50

1121. Magdeburg Hemispheres, of brass, 3 inches in diameter..... 7 00

1122. " " " 3½ " " 8 00

1123. " " " 4¼ " " 9 00

1124.

1137.

1124. Fountain in Vacuo, Cock, Jet, and Stand, with india rubber tube to connect with receiver of water without removing the fountain from the stand, a very great improvement on the old way..... $ 8 00

1125. Same as No. 1124, but smaller in size..... 6 00

1126. Condensed Air Fountain, for copper vessel, with various jets, Condensing and Exhausting Syringe..... 25 00

1127. Condensing and Exhausting Syringe 8 x 1¼..... 8 50

1128. Revolving Jet, for Condensed Air Fountain..... 3 00

1129. Air Gun Jet, for Condensed Air Fountain..... 1 00

1130. Funnel and Ball, for Condensed Air Fountain..... 1 25

1131. Revolving Jet, in Vacuo..... 3 00

1132. Revolving Jet and Fountain in Vacuo..... 4 00

1133. Cupping Glass, with Stop-cock..... 4 00

1134. Glass Flask, for boiling water in vacuo or under pressure..... 5 00

1135. Brass Plate, with Sliding Rod, Hook and Clamp..... 5 75

1136. Bolt Head Experiment..... 4 00

1137. Guinea and Feather Apparatus, large size, 3 feet long..... 9 50

1138. " " " small size..... 8 00

Nos. 1126 to 1130 form a set, and are complete in themselves, and do not need an Air Pump.

1139. Bladder and Weight, large size, wood tripod, stand, glass receiver, brass cap and screw, bag and weight..... $18 00
1140. Bladder and Weight..... 5 00
1141. Bell in Vacuo, same as shown in No. 1090..... 4 00
1142. Air Mills, to illustrate the resistance of the air to bodies in motion 10 00
1143. Mercury Cup..... 1 50
1144. Receiver Cup, for Mercury Shower.....$2 00 to 3 00
1145. Bursting Squares, per doz..... 2 50
1146. Wire Guard, for Bursting Squares..... 75
1147. Valve Cap..... 60
1148. Block of Wood, weighted to sink in water, to show the air contained in the pores of the wood..... 35
1149. Pneumatic Paradox, of Glass. The ball placed upon one end (the cup) cannot be blown off, and on the other can be supported on a jet of air. It is used with the mouth..... 50
1150. Water Hammer—showing that the collision of water in a vacuum produces a sharp noise, like solid bodies..... 1 25

1151.

1151. Revolving Fans and Handle, to show resistance of air..... $ 1 25
1152. Illustration of the Diving Bell, of glass..... 2 50
1153. Palm Glass, or Pulse Glass, the liquid in which appears to boil by the heat of the hand..... 1 25
1154. Air Shower, made of porous wood..... 1 25
1155. Brass Globe, 3 inches in diameter, with stop-cock and scale beam for weighing air..... 8 00
1156. Balance Beam, with cork ball and counter-poise..... 4 50
1157. Water Pump, in Vacuo, a lift pump fitted to a ground plate, so that it may be used upon an open top receiver..... 11 00
1158. Barometer Tube, and brass plate for Torricellian experiment..... 4 50
1159. Bacchus Illustration, a figure, apparently drinking from a cask upon which it is seated..... 5 00
1160. Lung Glass..... 2 00
1161. Wind Mill, to be placed in the receiver of an air pump, and the air being exhausted and turned in again, revolves with great rapidity..... 5 00
1162. Bottle Imps.....each 50
1163. Leslie's Freezing Apparatus, 6 inch dish, bell glass, &c..... 2 50
1164. " " " 8 " " " 3 00
1165. Cryophorus in Vacuo..... 8 00
1166. Apparatus for showing the effects of burnt air in respiration..... 3 50

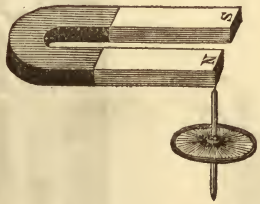
1167. Apparatus for igniting Gunpowder in Vacuo..... $6 50
1168. Double Transfer, with two 5 inch plates, and 3 stop-cocks..... 16 00
1169. Brass Plate, with sliding-rod, hook and check-screw, to enable the operator to perform any experiment in the receiver of an air pump..... 5 75
1170. Glass Flask, with cap and stop-cock for boiling water in Vacuo, or under pressure..... 5 00
1171. Stop-cock, with double outside screws..... 3 00
1172. " " inside screws..... 3 50
1173. " with inside and outside screws..... 3 25
1174. Guard Screw for pump plate..... 75
1175. Double Interior Couplers..... 1 50
1176. Double Exterior Couplers..... 1 00
1177. Interior and Exterior Couplers..... 1 25
1178. Oil for Air Pump, per bottle..... 50
1179. Leather Washers for stop-cock per dozen..... 15

Magnetism. Galvanism.

Electro-Magnetism, Thermo-Electricity and Magneto-Electricity.

1200.

1201.



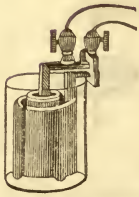
1204.

1200. Horse Shoe Magnets, 2½ to 7 inch.....25c. to $2 00
1201. Compound Horse Shoe Magnets.....$3 00 to 20 00
1202. Horse Shoe Magnet, with rolling wire armatures, to exhibit the mutual repulsion of two pieces of iron, magnetized by induction 3 00
1203. Horse Shoe Magnet, with armature, consisting of iron wire hermetically sealed in a glass tube, to prove that the inductive action of a magnet is not impeded by the interposition of an unmagnetizable body..... 1 50
1204. Horse Shoe Magnet, with brass wheel armature. In this the attraction of gravity so nearly overcomes the magnetic attraction as to leave but little friction, so that the wheel may be made to revolve rapidly for a long time..... 3 25

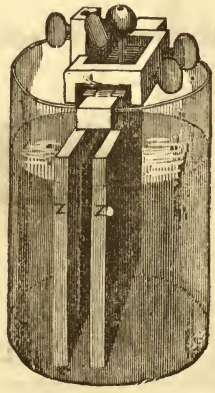
1205. Y Armature..... $0 75
1206. Star Plate..... 75
1207. Bar Magnets, small.....1 00 to 4 00
1208. " " large.....4 00 to 10 00

1209.

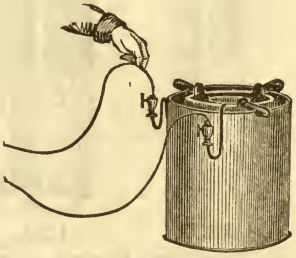
1209. Magnetic Needle, on stand..... $1 75
1210. Magnetic Dipping Needle, on universal joint, so as to exhibit the dip, as well as the north and south..... 7 00
1211. Dipping Needle..... 2 50
1212. Astatic Needle, on stand..... 3 50
1213. Magnetic Toys, Swan, Fish, etc., in box, with magnet.....50c. to 1 50



1214.



1220.

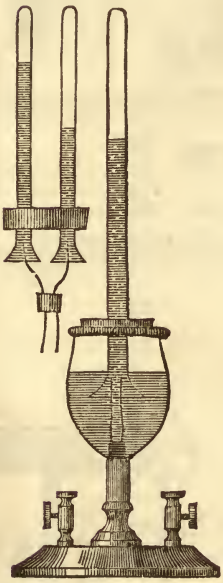


1222.

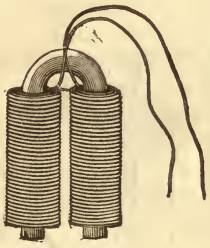
1214. Grove's Batteries, per cup..... $3 00
1215. " " 2 cups, in a neat walnut box..... 7 50
1216. " " 4 " " " " 14 00
1217. " " 6 " " " " 20 00
1218. " " 8 " " " " 27 00
1219. " " 12 " " " " 40 00
1220. Smee's Battery, per cup.....$3 50 and 5 00

As this Battery uses only one acid, it is cleaner and neater than any other; it is not as strong as Grove's Battery; it is also free from any disagreeable odor. A series of any number arranged to order.

1221. Daniel's Constant Battery..... $5 00
1222. Sulphate of Copper Battery, small size..... 4 00
1223. " " " large size..... 6 50
1224. Bunsen's Batteries, per cup..... 5 00
1225. Galvanometer. A delicate magnetic needle suspended inside of a flat coil of copper wire, the ends of which are attached to two binding screws at the base—to which the object under examination is also attached..... 6 50



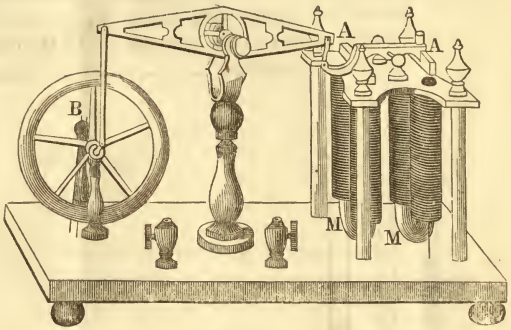
1226.



1227.

1226. Apparatus for decomposing water..... $3 50
1227. Electro Magnets—consists of soft iron wire bent in a U shape, and bound round with insulated copper wire, $1 50, 2 00, 2 50, 4 00, 6 00
1228. Electro Magnet, on stand..... 10 00
1229. Revolving Electro Magnet..... 8 00
1230. Revolving Armature—an electro magnet, having a revolving armature suspended over its poles..... 8 00

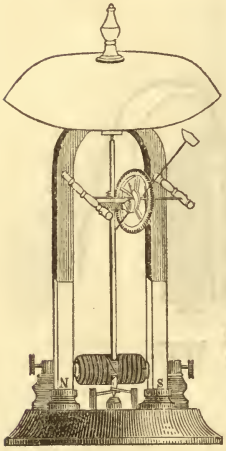
1231.



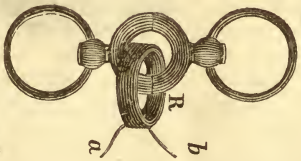
1232.

1231. Revolving Armature Engine..... $9 00

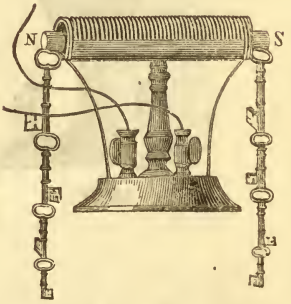
1232. Reciprocating Armature Engine—a very pleasing illustration of motion by magnetism, it does not require a very strong battery. 16 00



1233.



1234.



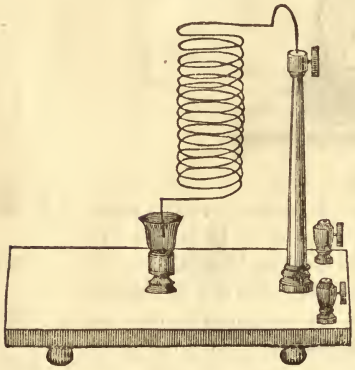
1235.

1233. Revolving Bell Engine—this is another mode of obtaining motion, and gives a very continuous motion; it is constructed on the same principle as the Fire Alarm Telegraph..... $16 00

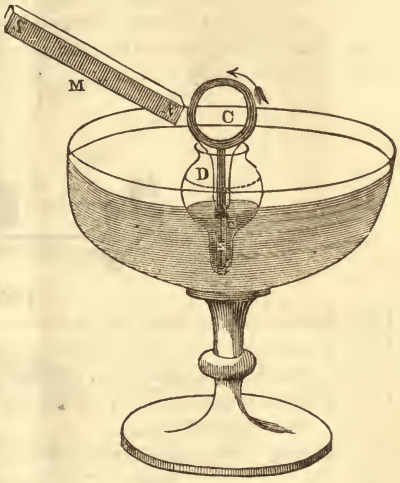
1234. Heliacle Ring, or Magic Circles—consists of two iron semicircles, made magnetic by the coil around them, are able to sustain a weight of 50 pounds or more..... 4 75

1235. Helix, on stand, with iron bar, to show that the magnetizing power of the wire is greatly increased by making a coil of it..... $4 50

1236. Helix, for 3 Pole Magnet; same as No. 1235, but the coil is separated in two parts..... 4 50



1237.



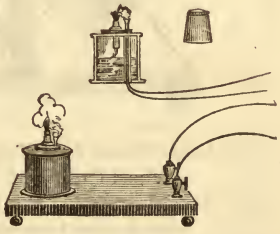
1238.

1237. Contracting Helix. The conducting wire is suspended in a Spiral Form from a pillar, and exhibits the mutual attraction between different portions of the same current moving in the same manner..... $5 50

1238. De La Rives Ring, in a small glass cup. This instrument is a simple Battery, the poles of which terminate in a coil of copper wire..... 1 75

1239. Voltaic Pistol, of brass, for exploding hydrogen or carburetted hydrogen gas..... 4 00

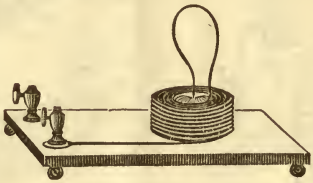
1240.



1245.

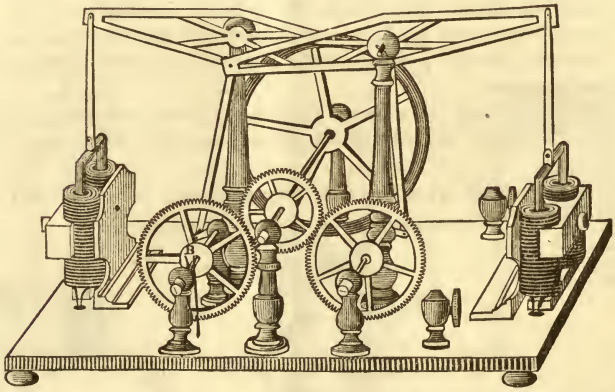
1240. Gunpowder Cup, of brass..... $1 00

1241. Same, with long handle, so arranged that the wire may be replaced in a few minutes, if burned off, packed in a box with extra platina wire and gun-cotton..... $4 00
1242. Apparatus for firing gunpowder under water..... 2 50
1243. Cotton-covered Copper Wire, from $2 00 to $4 00 per pound, according to size of wire, and current price of copper.
1244. Flat Spiral Copper Wire, per pound..... 1 50
1245. Galvanic Lamp..... 5 00



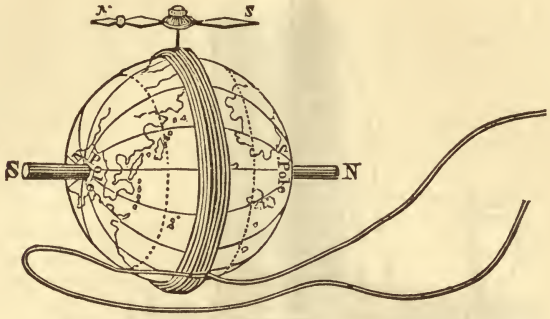
1246.

1246. Instrument for showing the revolution of mercury within a helix, $8 00
1247. Thermo-Electric Arch, between the poles of a U Magnet, for showing the production of Heat and Cold by Magnetism..... 7 00
1248. Thermo-Electric Arch, rotating between the poles of a U Magnet, with Spirit Lamp..... 7 00
1249. Thermo-Electric Pair, German Silver and Brass..... 65
1250. " " Series of 10..... 5 00
1251. " " Pair, Bismuth and Antimony..... 1 50



1252.

1252. Double Beam Axial Engine. This is upon the principle of force obtained from the Electric Current..... $25 00
1253. Revolving Coil. A coil of insulated copper wire is suspended upon a pivot between the poles of a permanent magnet..... 9 50
1254. Clock Work Electrotome, for breaking the circuit rapidly, in either a wire or spiral..... 11 00



1255.

1260.

1255. Globe and Coil, with Magnetic and Dipping Needle, illustrate the theory which ascribes the magnetism of the earth to electrical currents, circulating around it at right angles to its axis..... $6 50

1256. Coil with two rods for suspension, consists of a coil of insulated copper wire..... 4 00

1257. Revolving Spur Wheel..... 8 00

1258. Galvanometer Plane, indicates the presence of a current of electricity..... 5 50

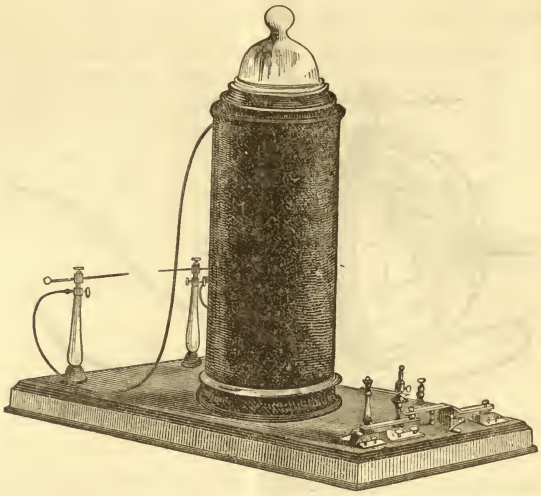
1259. Horizontal Galvanometer, on tripod stand, with levelling screws.. 9 75

1260. Galvanic Slippers, each..... 1 00

1261. Frog, or Leech Battery—consists of a strip of silver and a strip of zinc, so arranged that when a connection is made between them at one end, and the leg of a frog is placed between the other ends, a galvanic current is produced, causing the muscles of the frog to contract. If the tongue is put in place of the frog's leg, a stinging sensation is felt..... 1 25

1262. Electric Light in Vacuo..... 15 00

1263. Lignum-vitæ and Boxwood Charcoal, for the Electric Light in Vacuo, per doz..... 1 25



1264.

RITCHIE'S IMPROVED RUHMKORF APPARATUS.

One of the most important instruments which have been brought out for many years is the Ruhmkorf Induction Apparatus, by which almost all the effects of Static or Frictional Electricity are produced from the galvanic battery. I have improved the construction of the instrument, and have made it capable of throwing the spark more than double the length yet obtained in Europe, and by the use of a much smaller battery.

The power of the instrument is immensely greater than that of the largest electrical machine; one sufficient to throw the spark three inches has been found to evolve a quantity of electricity equal to that which could be produced by *eight hundred* machines of twenty-four inches diameter. It is not affected by the state of the atmosphere. The battery used is a Grove's or Bunsen's battery, of one to four cells.

The instrument, as constructed by me, consists of a primary coil of large copper wire, surrounding a bundle of iron wires, mounted upon a basement. A secondary coil or helix, of fine silk-covered wire, from one to ten miles in length, is wound upon a cylinder of thick gutta percha (each layer of which is insulated), which surrounds a glass bell or cylinder, closed at the top. The glass bell, with the coil, is placed over the primary coil; the terminals of the wire, enclosed in rubber tubes, lead to insulated pillars; and the discharges pass between platina points, or the current is conducted by wires to other apparatus to show its effects.

The current from the battery is received through wires by pole cups in connection with the primary helix, and passes through an interrupter or break-piece; within the basement, and connected with the interrupter, is placed a condenser of alternate strata of oiled silk and tin foil.

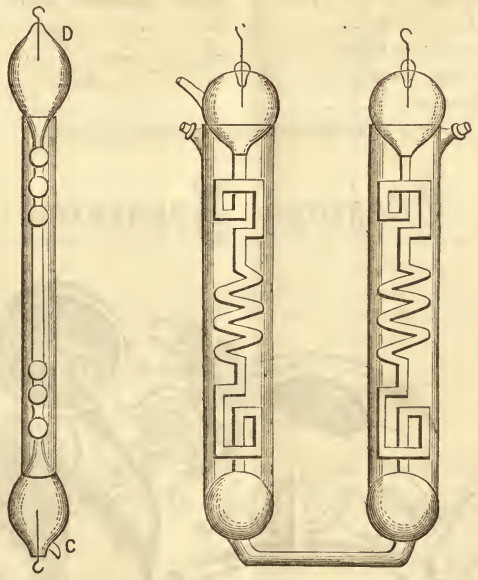
The instrument is mounted upon a mahogany or marble basement; the helix is covered with silk velvet, and rests upon a mahogany pedestal, and is finely finished.

1264. Induction Apparatus; basement of verd-antique marble, 24 by 17 inches; helix 10 inches diameter; height of instrument 25 inches; capable of throwing the spark from 10 to 12 inches..... $475 00

1265. Induction Apparatus; basement of mahogany, polished, 22 by 12 inches; helix 8 inches diameter; capable of throwing the spark 6 inches..... 275 00

1266. Induction Apparatus; mahogany basement, 20 by 11 inches; capable of throwing the spark 4 inches..... 200 00

1267. Induction Apparatus; mahogany basement, 20 by 9 inches; capable of throwing the spark 2½ inches..... 125 00

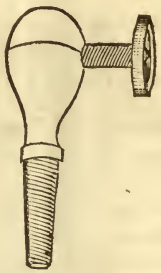


1268.

1268. Geisler Tubes, consisting of glass tubes of various forms, and containing chemical solutions and solids through which a spark from a Ruhmkorff Coil is passed, producing the most brilliant and striking phenomena in galvanism.....$4 00 to 15 00

In using place the tube in a convenient place for display, connect the platina wires which project from each end of the tubes with the poles of the Ruhmkorff coil, when, by breaking the current rapidly, a most brilliant illumination is produced, depending for brilliancy on the contents of the tube.

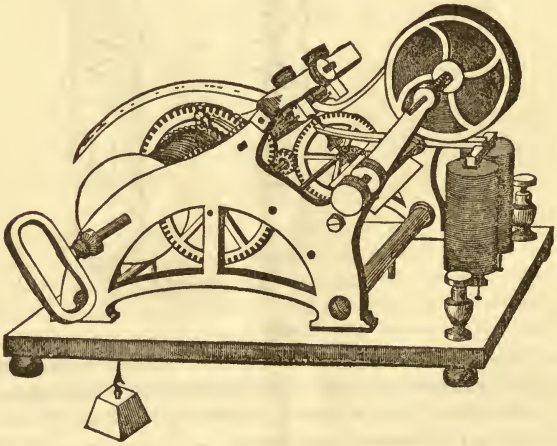
1269. Gassiot's Cascade, in Vacuo—consists of a goblet coated like a Leyden Jar..... $1 50



1275.

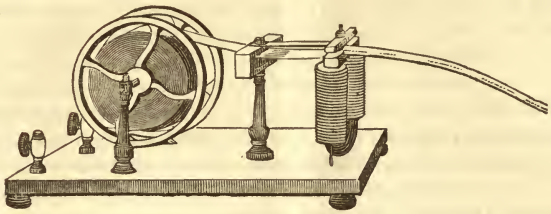
1270. Zinc Cylinders, either Grove's or Smee's Batteries, each..... 75
1271. Platina Slips, each..... 75
1272. Platinized Silver Slips, each..... 1 50
1273. Porous Cups, each..... 30
1274. Glass Cups, each..... 30
1275. Binding Screws, of 3 different shapes, each..... 50

Telegraph Apparatus.

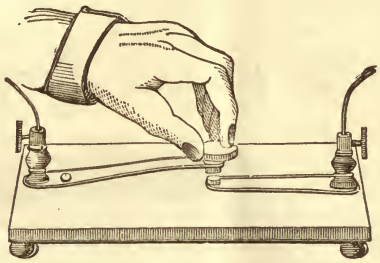


1280.

1280. Telegraph Model, with clockwork, consisting of the Electro-Magnet, Lever Armature, Marker and Drum, on which the paper is wound, neatly finished, on mahogany stand..... 33 00



1281.



1282.

1281. Telegraph Working Model for Schools..... $8 00

1282. Signal Key, for completing or breaking the current in telegraphing..... 2 25

***These Models of Telegraphs require the Telegraph Model, the Key, Copper Wire and a Battery to make them complete; thus, No. 1281 will cost, when complete for use, as follows:

Model, No. 1281	$8 00
Key, No. 1282	2 25
Battery, No. 1214, with Extra Porous Cup	3 60
Copper Wire, 10 yards	75
Total	14 60

TELEGRAPH REGISTERS FOR TELEGRAPH LINES.

1283. Telegraph Registers, No. 1 ..... 50 00

1284. " " " 2..... 45 00

1285. " " " 3..... 40 00

1286. Register Weights, each..... 3 50

1287. " Cords, each..... 50

1288. " Paper, per pound..... 40

1289. Sounders, No. 1, local..... 15 00

1290. " Pony..... 10 00

1291. " for Main Circuits..... 25 00

1292. Keys, No. 1, each..... 8 00

1293. " " 2, " 7 00

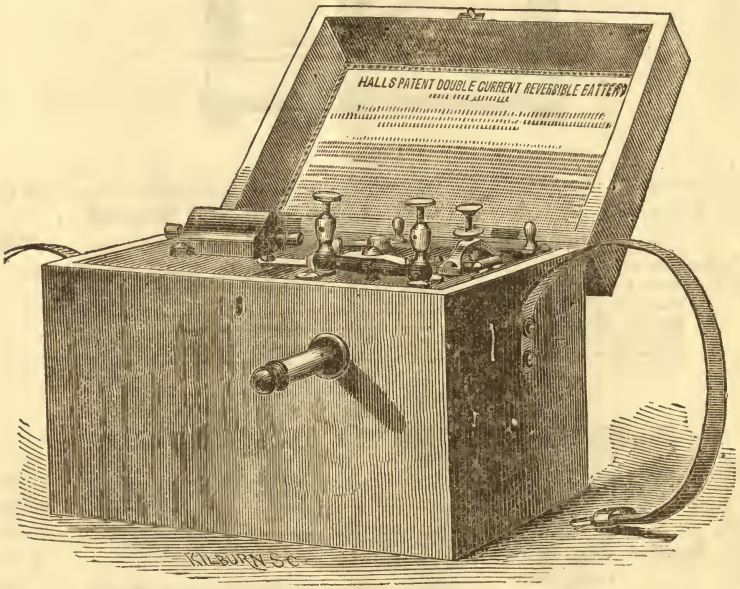
1294. " " 3, " 6 00

1295. Ground Switches, each.....$2 00 to 3 00
1296. Insulators, Glass..... 12
1297. " Rubber..... 25
1298. " Brooke's Patent, furnished to order.....
1299. Insulator Brackets.....8 cents to 10
1300. Local Battery, complete, price according to size.....
1301. Main Battery, Grove's, complete, price according to size.....
1302. " " Carbon, complete, price according to size.....
1303. Galvanized Iron Wire, No. 9, per pound..... 20

330 *pounds to the mile; by the* 100 *pounds,* 15 *cents, per pound.*

☞Stationery and Materials furnished to order.

Apparatus for Medical Purposes, etc.



PATENT DOUBLE CURRENT REVERSIBLE BATTERY.
1305.

1305. Patent Double Current Reversible Battery..... 18 00

For remedial purposes, designed for physicians' and dentists' use, this is a decided improvement over all other instruments for the application of electricity as a therapeutic and anæsthetic agent, as it is constantly ready for operation, and requires no cleaning of the zinc plates, as in other batteries. It will remain

in action some two or three months without adding new solution. It can be operated with the box closed, thereby preventing the noise of the armature to escape. It is also portable, and well made in every respect. This instrument is now being used by some of the first physicians and surgeon-dentists in the country, who have very kindly permitted me to refer to them in regard to its merits. This instrument is arranged to produce two currents, the primary and secondary. Both the currents are combined in the same instrument, and can be brought to bear on the directors by merely moving a lever or switch, without disconnecting the wires. The primary current is that which comes direct from the battery, through the coarse wire of the helix, consequently is in one direction.

When the battery current is made to flow through the body, there is, at the commencement, a greater or less convulsion of the muscles of the part interposed, though its continued passage may be nearly insensible, and is recommended where it is desirable to exercise an organizing power over the muscles, also for various internal diseases.

The secondary, or interrupted current, is of high intensity and of small quantity, and proceeds from the fine wire (which surrounds the coarse wire) which is induced from the battery current flowing through the coarse wire, and is used for rheumatic and nervous diseases. This instrument is so constructed that it can be operated with the box shut, thereby preventing the noise from the vibrating armature, and also keeping the instrument free from dust.

One of the most useful arrangements constructed with this instrument is the simple convenience for changing the poles from one electrode to the other; to do this, you merely move the bar of wood to which the wires are attached by means of the screw cups, one-half inch to the right or left, and it instantly changes the current from one electrode to the other. This avoids the necessity of changing the handles, which is a great advantage in applying electricity, and is the only instrument in the world that has a pole changer attached.

The instrument is contained in a well-finished black-walnut box, with straps to carry it. Dimensions of box, seven and a half inches high, nine and a half inches long, and seven wide. The base is highly polished, and the metal work is silver-plated. Size of glass jar to Fig. 1, six inches long, three and three-fourths wide, four and one-half deep; size of zincs, five inches long, five and one-half wide, one-half inch thick.

They are made of the best distilled zinc. As the glass jar and zincs are the only parts that are liable to break or wear out, we have given the exact dimensions; so that by sending the above dimensions it will avoid mistakes. Price of glass jar, $1 00; price of zincs, $1 00. This instrument is complete, in black-walnut boxes, including Hall's flexible conducting cords, and albatum directors.

DIRECTIONS FOR SETTING UP AND USING HALL'S PATENT REVERSIBLE BATTERY.

Raise the zincs out of the box, then fill the glass vessel within one inch and a half of the top with water, then add one ounce (or two table-spoonsful) of

sulphuric acid, replace the zincs in this solution. Connect the two German silver levers in the slots of the posts opposite, by crowding them in the slots, being sure that they make good contact. This brings the battery in connection with the instrument, which will immediately vibrate the armature. It is well to give the armature an impulse with the finger, if it does not start of its own accord.

Disconnect the battery by removing the levers from the posts, when not in use, as the zincs are only in action when the levers are in the posts.

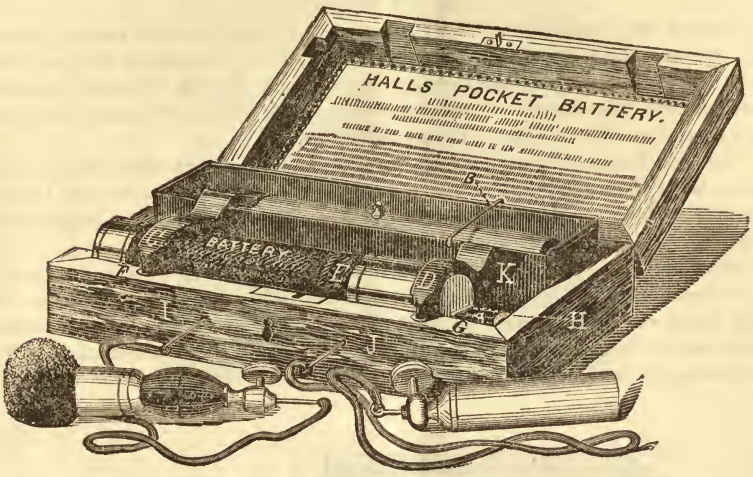
The battery consists of amalgamated zincs and platinum. The zincs are prepared with mercury, being first immersed in a solution of sulphuric acid and water—about one-tenth acid to water. This solution thoroughly cleans the zincs so that the mercury amalgamates with them. It is well to rub the mercury on with a piece of cloth, or an old tooth-brush. Care should be taken to keep the plates well coated with mercury, as the action of the battery depends greatly on the amalgamation of the zincs.

Do not let the platinum or centre plate touch the zincs, as this would stop the action of the battery. The battery is ready for use, having been amalgamated previous to selling, but it would be as well to re-amalgamate them after a week's use, as the mercury does not thoroughly penetrate the zincs the first time amalgamated.

Connect the directors to the flexible cords by means of the screws, pass the other ends through the eyelets of the box, and connect them with screws on pole-changer bar. By this arrangement you can shut the box entirely up, and still operate, the four knobs being marked P and N to represent the positive and negative pole of the battery. If, after using it some time, the current grows weak and feeble, look at the zinc plates; if they look black, they need re-amalgamating; if they are bright and well coated with mercury, the solution must be at fault. Throw away and prepare new, and the instrument will operate with renewed vigor.

After having seen that the zincs are in order, and the solution being made according to directions, if the instrument still refuses to operate, the fault must be in the vibrating armature, which is placed under the arch of brass; this must be adjusted so that the iron hammer is about a sixteenth of an inch from the face of the magnet; then screw the spiral spring down, so as to touch the flat spring; then tighten the screw by the lower nut, and there will be no difficulty in the instruments operating.

The current is regulated by the rod drawn out of the large eyelet hole. When it is entirely out there is no perceptible current; as you insert the rod it increases the current until it is entirely in, then the instrument is at its full strength. The manner of bringing the secondary and primary currents to connect with the directors or cords, is done by a switch on the base of the instrument. When the switch is on the knob of brass marked S, you get the secondary current, which is very powerful; when on the knob marked P, the positive current is in connection. The different currents in our instruments are changed by moving the switch from one knob to the other.



1306.

1306. Patent Pocket Battery..... $10 00

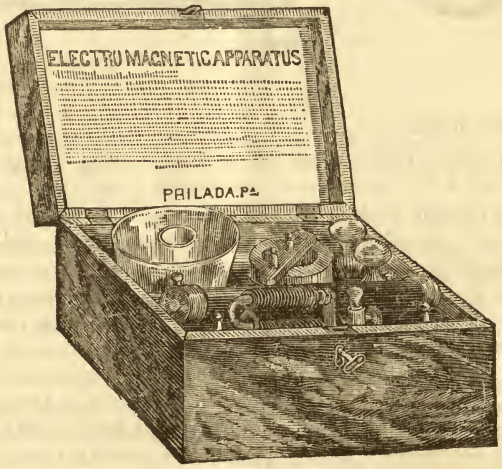
Hall's Patent Pocket Battery, contained in a neat black-walnut box, eight inches long, five and a half inches wide, two inches deep; thus occupying no more space than a common book, it can easily be carried in the coat pocket. It is very powerful, and one of the most convenient batteries we make. It is so well made and simple that it cannot get out of order. And it is impossible to connect it wrong, as all the parts are made to fit in their respective places. Every physician ought to have this instrument, as it is so portable that they can use it in their practice out of their office. The zinc is so constructed that it can easily be cleaned, being nothing more than a straight bar of zinc, and is insulated from the copper by means of a new insulation, on the bottom of the copper dish instead of the top, as in all other batteries. The zinc is the only part that wears out, and this can be obtained in any part of the country where there are foundries, as it is only a bar of zinc weighing one pound. *K* is the copper dish to hold the solution, *D* is the connection from the copper to the helix, *C* the connection from zinc to helix; they fit into an eyelet on the edge of the box, marked *F* and *G*. *E* is the helix, made of the softest insulated copper wire. *H* is the vibrating armature, so constructed that it cannot get out of order. *I* and *J* are the eyelets to receive the pins of the connecting cords, marked *P* and *N*, to designate the positive and negative poles. This is one of the most salable batteries we make.

DIRECTIONS HOW TO USE AND TAKE CARE OF THE INSTRUMENT.

Connect the battery with the instrument by means of metallic straps; insert the pin on the end of the strap in the metallic holes on the edge of the box; see that the ends of the pins and sockets are clean, in order that there may be good connections. The solution is composed of sulphate of copper (blue vitriol), in the proportion of one ounce to the pint of water.

The zinc becomes coated in the battery; hence remove it when not in use; and when dry scrape clean with an old knife, so as to expose again the bright surface of the zinc, as this is apt to make connection between the copper and zinc.

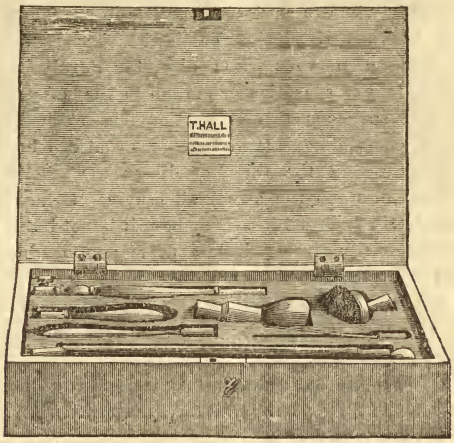
When first connected, give the hammer at the end an impulse with the finger, if it does not start of its own accord. Connect each of the metallic handles on one end of the cord by means of the binding screws, then insert the pins on the other end of the cord in the eyelet in the front of the box; crowd them in well, so as to make good contact.



1307.

1307. Electro-Magnetic Machines, for nervous diseases, shocks, etc., in a neat walnut box, with Grove's Battery, handle and cords, printed directions accompany each instrument..... $10 00

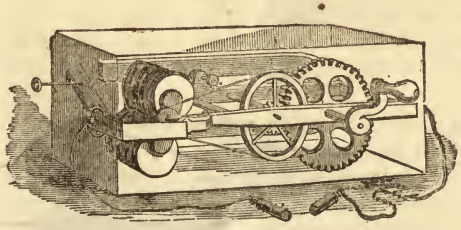
1308. Electro-Magnetic Machine, same as No. 1307, but has Sulphate of Copper Battery, in place of Groves; this is much neater and cleaner, but not quite so strong..... 10 00



1309

1309. Hall's Universal Handles, embracing the Tongue, Ear, Eye, Rectum, Sponge, Womb, and Vagina Directors, silver-plated. By this arrangement all the Directors are fitted to one handle. As only one of them is used at a time, they need only one insulated handle, which makes the whole set much cheaper than if each had a handle attached. The directors should be covered with cotton flannel moistened with water, when in use, as this will prevent that burning sensation so disagreeable to patients. In the eye-cup tepid water must be used

1. Womb; 2. Vagina; 3. Insulated Handle, into which the directors all fit; 4. Sponge; 5. Tongue; 6. Ear; 7. Rectum; 8. Eye Glass; in a neat Walnut Box with lock and key..... $8 00



1310.

1310. Magneto-Electric Machine for medical purposes, without the use of acid or battery..... 10 00

In this machine the power is produced by a coil of wire revolving near a magnet, by a crank turned by hand; it requires no acid, and is always ready for use, but is not so powerful as those at the same price with a Battery.

This machine is widely known as the best article in use for the cure of nervous diseases, such as Nervous Headache, Toothache, Tic Douloureux, Lumbago, Sciatica, and all forms of nervous pain: also, for Paralysis in all its various forms, from a partial loss of sensation or motion to that of perfect Paralysis.

To physicians and surgeons this is particularly recommended as a truly scientific instrument, combining all the advantages that can be obtained from the use of Electric Machines in the relief of diseases, while it has none of the inconveniences attendant upon the use of all others. Being simple in its construction, and completely enclosed in a firm box, it is not liable to derangement; and, obtaining its electricity directly from a permanent magnet, it is constantly ready for use, and it is not affected by moisture, but it is equally powerful in wet as dry weather, and can be graduated to any desirable degree of strength. It requires no acids, and may be used for weeks without opening the box, except occasionally to oil the bearings.

1311. Same as No. 1310; but has a double magnet, making it much more powerful..... $18 00

1312. Insulated Handles, per pair..... 1 50

1313.

1314.

1313. Sponge Handles, each..... $1 50

1314. Galvanic Slippers, per pair..... 1 50

1315. Insulated wire, per yard..... 15

DESCRIPTION OF THE VARIOUS FORMS OF THE GALVANIC BATTERIES.

Galvanic Batteries consist, essentially, of two metals, separated from each other and immersed in some dilute acid, which will act on one of the metals, but not on the other. The electric current is conducted by wires fastened to each of the metals. The metals commonly used are copper and zinc, and the acid, the sulphuric (oil of vitriol). This is the earliest form of battery, but is soon exhausted, and requires constant cleaning.

Another battery consists of a cup of copper, containing a solution of sulphate of copper, (blue stone or blue vitriol). A piece of zinc is put into it and the electricity carried by wires fastened to the cup and to the zinc. This forms an energetic battery for a short time, but a black deposit is soon formed on the zinc, and the action gradually ceases. It is very troublesome to clean.

Another battery may be formed with a copper cup containing a solution of sulphate of copper, into which is put an unglazed porcelain cup, containing a dilute acid, (sulphuric). Into this porous cup and acid is placed a rod of zinc, covered with mercury, (amalgamated). The porous cup allows the fluids to come in contact with each other and to transmit the electricity, but prevents any thing passing through to form a deposit. Hence the action is constant, and its energy sustained as long as the zinc lasts and enough of the sulphate is kept in the solution. From its inventor, it is called Daniel's Constant or Sustaining Battery.

Another kind of battery is formed of a plate of silver with a deposit of platina upon it, and a plate of amalgamated zinc. These plates are immersed in dilute sulphuric acid, contained in a glass vessel. The zinc may be in the form of a cylinder, and a platina plate substituted for the platinized silver plate. This is a neat, cleanly, and constant battery, and is much preferred for electrotyping, gold and silver plating, &c. From the name of the inventor it is called Smee's Battery.

Another battery is made by putting a cylinder of amalgamated zinc, in diluted sulphuric acid, contained in a glass vessel. Within this zinc cylinder a porous cup, containing strong nitric acid, is placed. A strip of platina is immersed in the nitric acid. The whole constitutes a very powerful battery, but is objectionable on account of the nitrous fumes given off, which are injurious to the lungs and to surrounding furniture, instruments, &c. It is called Groves' Nitric Acid Battery, and is used in telegraphing.

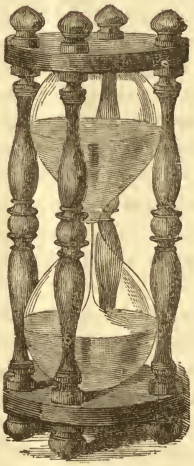
If a large pair of plates of copper and zinc be formed into a battery, a great *quantity* of electricity would be evolved, and great heating and melting effects would be produced, but it could not send a current of electricity far through a wire. But if the same pair of plates be cut up into many smaller pairs, and put into as many cups, with the exciting fluid, and the zinc of one cup be connected with the copper of the next cup, and so on through the series, the electricity would be found to have an *intensity* of energy which would drive it through a very great length of wire. In the one case there is great *quantity*, in the other great *intensity*. Groves' Battery combines the two principles to a greater extent than any other form of battery, and hence is best adapted to telegraphing.

The price of batteries depends on their size, and may be combined to produce any effects desired. Smee's, considering the effects it produces with a given amount of material, is thought to be the cheapest kind of galvanic battery.

There are also several other forms of Batteries, such as Bunsen's, Carbon, &c., the principle however is the same, the only difference being in the materials used.

☞ Printed directions for Electro-Gilding and Plating furnished on application.

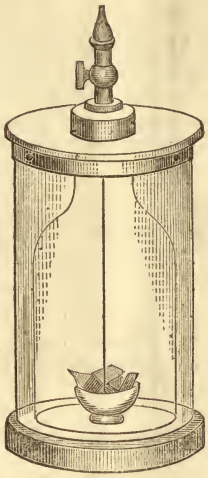
Hour Glasses.



1320.

1320.	Sand Glass, one hour,	Rosewood Frame	$2 00
1321.	" "	Whitewood Frame	1 50
1322.	" "	Common Wood Frame	1 25
1323.	" half hour,	Rosewood Frame	1 75
1324.	" "	Whitewood Frame	1 25
1325.	" "	Common Wood Frame	1 00
1326.	" quarter hour,	Rosewood Frame	1 25
1327.	" "	Whitewood Frame	1 00
1328.	" three minutes,	Rosewood Frame	75
1329.	" "	Bronzed Frame, to turn	75

Chemistry.



1330.

1330.	Hydrogen Generator (of glass), with stop-cock and jet	$7 00
1331.	Glass Tubes, for musical tones by the combustion of Hydrogen	75
1332.	Plain Bell Glass Receiver, quart,	80
1333.	" " , ½ gall.,	1 25
1334.	" " , 1 gall.,	2 00
1335.	" " , 2 gall.,	2 75
1336.	Receivers tubulated with small stoppers, for illustrating the combustion of solid bodies in gases, quart,	1 10
1337.	" " " " ½ gall.,	1 50
1338.	" " " " 1 gall.,	2 50
1339.	Receivers open and ground at both ends, quart,	1 00
1340.	" " " , ½ gall.,	1 50
1341.	" " " , 1 gall.,	2 50
1342.	Bell Glass Receivers with cap for stop-cock, for transferring gases, 1 gall.,	3 00
1343.	Retort, tubulated, ½ pint,	60
1344.	" " , pint,	75
1345.	" " , quart,	1 00
1346.	Retort, plain, ½ pint	35
1347.	" pint	50
1348.	" quart	60
1349.	Woulfe's Bottles, 3 necks, pint	1 00
1350.	" " " quart	1 25

1351. Iron Retort Stand, with 3 rings..... $1 75
1352. Copper Retort for making Oxygen..... 6 00
1353. Gas Bags of India Rubber, with stop-cock, 16 gal..... 13 00
1354. " " " " " " 24 " 16 00
1355. India Rubber Tubing, per foot..... 40
1356. Compound Blow-Pipe and Pneumatic Cistern of Copper..... 35 00
1357. Pneumatic Cistern (of copper), with sliding shelf..... 12 00
1358. Pneumatic Cistern (of tin,) with sliding shelf..... 5 00
1359. Balloons, of Gold Beaters Skin, for showing the lightness of Hydrogen Gas.....1 50 and 3 50
1360. Deflagrating Spoon..... — 40
1361. Gas Pistol, of tin, japanned..... 75
1362. Crucibles, sand, 5 in a nest, per nest..... 20
1363. Candle Bombs, per doz..... 30
1364. Platina Wire, per grain..... 05
1365. " Foil, per grain..... 05
1366. Prince Rupert's Drops, per doz..... 80
1367. Bologna Cups, of unannealed glass, can be broken by a small piece of flint; but resist a hard blow.....
1368. Syphons, of glass, plain..... 30
1369. " " with mouth tube..... 75
1370. Test Tubes, per doz..... 75
1371. Wood Stand for Test Tubes..... 1 00
1372. Glass Tubing, per pound..... 75
1373. Spirit Lamp, with cover, each.....50 c. and 1 00
1374. Eolopiles, for throwing a burning jet of Ether..... 40
1375. Blow Pipes, usual form..... 40
1376. " " with bulb..... 75
1377. " " Berzelius, with ivory mouth piece and platina point... 3 00
1378. Set of Apparatus and Chemicals to illustrate Foster's chemistry; the whole packed carefully in a strong box for transportation... 30 00

Containing the following: Deflagrating Spoon, ¼ lb., assorted Glass tube, Stop Cock, 3 Test Glasses, Pneumatic Trough, ½ gallon, Bell Glass with Stop Cock, 4 ounce Glass Funnel, Pint Retort, ½ pint Retort, 4 ounce Retort, Plain Globular Receiver, Retort Stand, Sand Bath, Hydrogen Generator, Nest of Crucibles, Nest of Beaker Glasses, Glass Spirit Lamp, Test Tube Rack and Tubes, Gas Pistol, Gas Bag and Stop Cock for inhalation, 2 Gas Jets, Quart Specie Jar, Eolophile, 1 ounce Graduated Measures, Pint Flask, ½ Pint Flask, Chemical Flask, pair of Scales and Weights, Pipette, Leaden Cups for Hydrofluoric Acid.

CHEMICALS.—Chlorate of Potash, oxide of Manganese, Sulphuret of Iron Copper Turnings, Phosphorus, Caustic Potash, Fluor Spar, Brazil Wood, Litmus, Turmeric, Potassium, Iodine, Bromine, Nickel, Cadmium, Antimony, Arsenium, Platinum, Carbonate of Potash, Nitrate of Strontia, Chromate of Potash, Bi-Chromate of Potash, Iodide of Potassium, Nitrate of Silver, Nitrate of Ammonia, Sodium, Sulphuric Ether, Zinc, Nut-Galls, Protro-Nitrate Mercury, Bi-Chlorate Mercury, Aqua, Ammonia, Bottles, &c. (See No. 1451 Books.)

Any Chemical Apparatus furnished to order.

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1380. Mathematical Paradox, or Curious Block, which fits exactly, and passes through a square, a circle and a triangle..... 1 00
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1383. Prince Rupert's Drops, per doz..... 80
1384. Pulse Glasses—the liquid in which appears to boil by the heat of the hand..... 1 00
1385. Candle Bomb, per doz..... 30
1386. Pneumatic Paradox, of glass, with cup and ball..... 50
1387. Magnetic Toys.....50 c. to $1 50
1388. Tableaux Fires, of various colors, for illuminating Tableaux, in neat tin box—
Red, per box..... 75
Green, " 75
Blue, " 75
Yellow, " 75
White, " 75

Magnesium.

A newly discovered metal capable of being ignited by a common match, and burning with a brilliancy equal to that of 74 Stearine Candles, producing a light that can be seen for nearly thirty miles, and so intense that it causes a gas flame to cast a shadow.

1389. Magnesium Wire, coil of 4 feet..... 25
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